WIRE & WIRE PRODUCTS

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

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NEW methods

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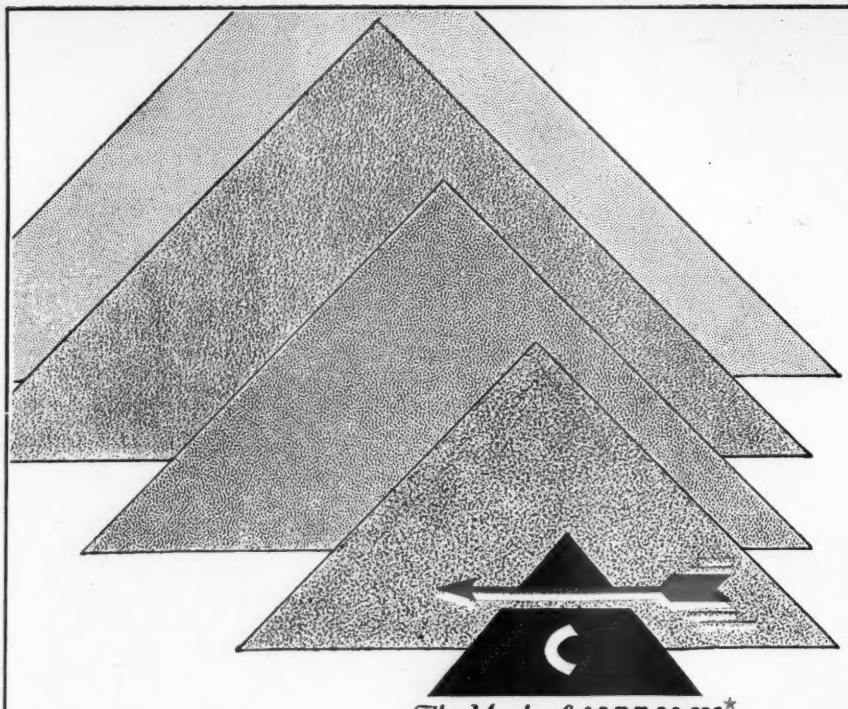
January 1931



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TRADE MARK REG.

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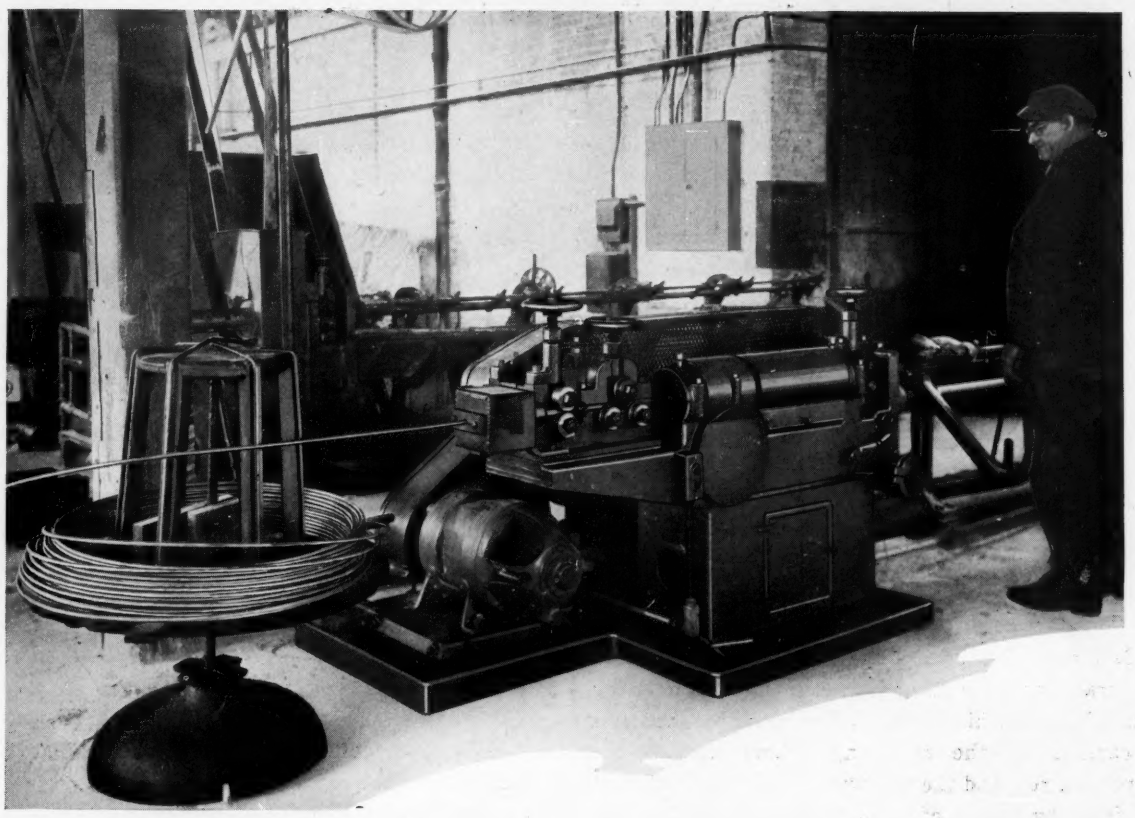

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Production increased 50% is the report of the user in whose plant the photograph shown was taken.

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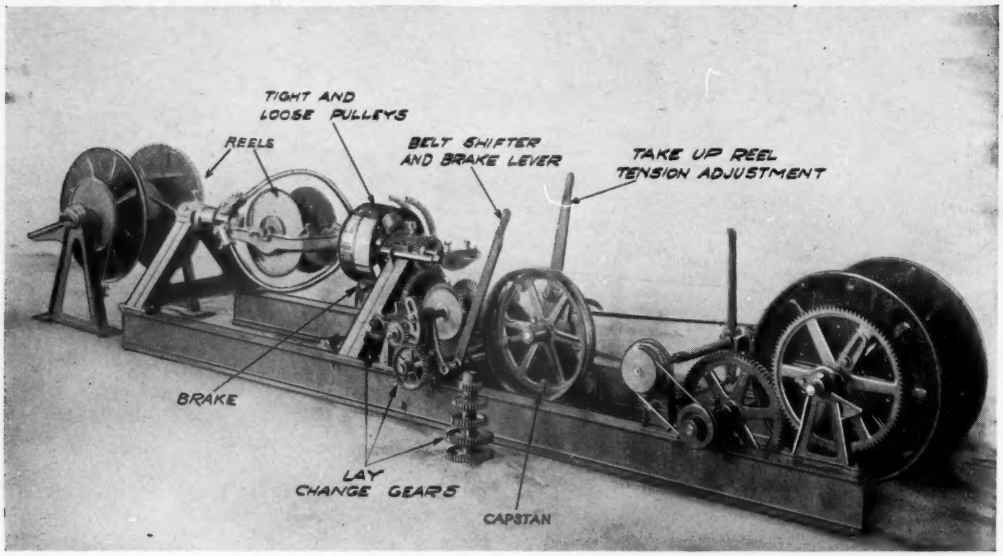

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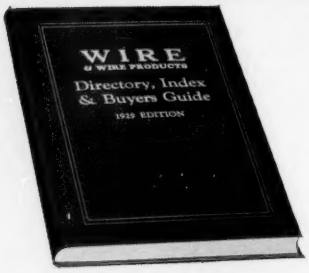

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Of The Wire Association

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Machinery, Supplies and Equipment for
Wire Drawing and Forming
Formed and Fabricated Wire and Wire Products

Over eight hundred classifications, alphabetically arranged, cover everything used in making and forming all kinds of wire. Listings range from Abrasives to Zinc Wire.

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4. A complete list of **French** wire drawing and fabricating mills.
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Name .....

Address .....

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WIRE & WIRE PRODUCTS

A monthly publication devoted to the production of Wire & Wire Products in all metals from the bar to the finished wire product.

Vol. 6 January 1931 No. 1

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Official Publication of The Wire Association

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Constructed of corrosion resisting materials, three to four times the life of a wooden reel is a reasonable expectancy. The cost of a "Red Head" Reel is less than twice the cost of a wooden reel.

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Smooth inner surfaces: Much greater strength with the absence of all cutting or abrading projections—these protect not only the cable but the men handling it.

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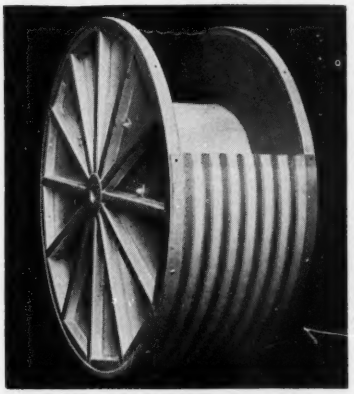

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WIRE & WIRE PRODUCTS

A Monthly Publication Devoted to the Production of Wire and Wire Products in all Metals from the Bar to the Finished Wire Product.

Vol. 6 JANUARY, 1931 No. 1

THE WIRE INDUSTRY

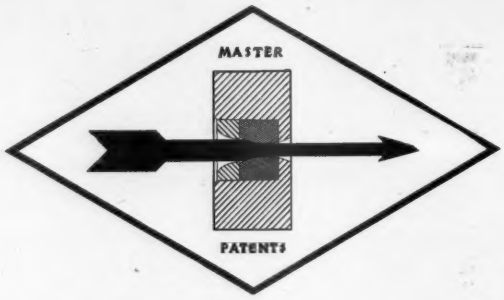
Production of Wire and Wire Products for 1929 compared with 1927 shows an increase of 26.8 per cent in 2 Years ▼ ▼ ▼ ▼ ▼

THE Bureau of the Census announces that, according to data collected in the Census of Manufactures taken in 1930, the total value of wire and wire products made in 1929 for sale by manufacturers in the United States amounted to $884,460,174, an increase of 26.8 per cent as compared with $697,684,133 reported for 1927. Of the 1929 total, $284,714,383 was contributed by wire and $599,745,791 by wire products. Of the wire, part was sold to other manufacturers for use as a material in the fabrication of wire products.

The total production of wire was as follows: Plain iron and steel wire, 3,089,278 tons (of 2,000 pounds); copper wire, 1,110,180,416 pounds; brass wire, 69,383,040 pounds; other nonferrous wire, 54,519,594 pounds. These amounts show increases of 7.8, 41.1, 8.5, and 31.9 per cent, respectively, as compared with 2,865,223 tons of plain iron and steel wire, 786,563,653 pounds of copper wire, 63,929,247 pounds of brass wire, and 41,325,539 pounds of other nonferrous wire reported for 1927, the last preceding census year. The foregoing figures cover both wire made for sale and that made and consumed in the same plants in the manufacture of fabricated wire products.

The more important of the products made from iron and steel wire in 1929 were as follows: Rope or cable, except insulated, 153,304 tons, valued at $46,876,871; strand, galvanized, 48,565 tons, $5,617,900; nails, brads, and spikes, 13,513,959 kegs (of 100 pounds), $43,893,415; woven-wire fence, except poultry netting, 361,605 tons, $30,747,802; barbed wire, 221,809 tons, $13,824,143; fly screening, 64,728,176 pounds, $9,942,027; poultry netting, 46,733 tons, $7,536,147; other woven wire, 120,478 tons, $10,465,091; bale ties, 148,024,426 pounds, $5,074,435; wire springs, $42,679,404. The leading products made from nonferrous wire were: Copper fly screening, 4,993,338 pounds, $1,768,291; nonferrous-metal fly screening other than copper, 10,096,746 pounds, $3,356,524; Fourdrinier and cylinder wire cloth, 2,321,149 pounds, $3,938,659; copper strand, except insulated, 88,395,338 pounds, $18,616,600. Insulated wire and cable, valued at $296,858,831, also were reported (data on quantity incomplete).

The drawing of wire was reported by 147 establishments, of which 81 drew wire from purchased bars or rods, 42 were operated as departments of steel rolling mills, and 24 were operated as departments of nonferrous-metal rolling mills. The number of establishments engaged primarily in the manufacture of wire products from purchased wire was 584. In addition, fabricated wire was also reported as a secondary product by establishments engaged primarily in other lines of manufacture.



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Sectional Hexagon, Square and Octagon Dies

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408 Concord Ave., New York

BARE WIRE

Class and Kind	1929 Quantity	1929 Value	1927 Quantity	1927 Value
Bare Wire				
Iron and steel (plain wire), tons	3,089,278	———	2,865,223	———
Copper, pounds	1,110,180,416	———	786,563,653	———
Brass, pounds	69,383,040	———	63,929,247	———
Other nonferrous, pounds	54,519,594	———	41,325,539	———

IRON AND STEEL WIRE

Class and Kind	1929 Quantity	1929 Value	1927 Qautity	1927 Value
Plain Wire—				
For sale, tons	1,074,076	$78,992,297	801,045	$59,553,429
Transferred to other plants of same company (assigned value), tons	129,567	9,463,755	106,044	8,065,414
Produced and consumed in same works, including that subsequently galvanized, or otherwise coated, and cold-rolled, (no value assigned), tons	1,883,518	———	1,958,134	———
Drawn on contract or custom basis from rods furnished by others, tons	2,117	———	(1)	(1)
Galvanized Wire—				
For sale and interplant transfer, tons	268,796	19,656,380	249,671	17,034,950
Produced and consumed in same works (no value assigned), tons	574,402	———	577,578	———
Other Coated Wire—				
For sale and interplant transfer, tons	52,242	8,143,031	44,924	6,368,147
Produced and consumed in same works (no value assigned), tons	4,805	———	1,829	———
Cold-rolled from Drawn Wire—				
For sale and interplant transfer, tons	28,757	4,201,839	2/149,803	2/18,543,650
Produced and consumed in same works, (no value assigned), tons	14,271	———	2,274	———

NON-FERROUS WIRE

Class and Kind	1929 Quantity	1929 Value	1927 Quantity	1927 Value
Copper Wire—				
For sale, pounds	387,208,916	$85,435,190	457,705,764	$71,924,701
Transferred to other plants of same company (assigned value), pounds	163,214,495	34,394,555	34,113,102	5,165,639
Produced and consumed in same works (no value assigned), pounds	407,996,224	———	294,744,787	———
Drawn on contract or custom basis from rods or bars furnished by others, pounds	151,760,781	———	(1)	———
Brass Wire—				
For sale, pounds	61,874,720	18,334,479	56,534,689	10,907,363
Transferred to other plants of same company (assigned value), pounds	4,818,823	1,240,719	4,308,879	785,762
Produced and consumed in same works (no valuue assigned), pounds	2,689,497	———	3,085,679	———
Other nonferrous wire 3/—				
For sale and interplant transfer, pounds	52,844,888	24,852,138	34,116,973	12,009,276
Produced and consumed in same works (no value assigned), pounds	1,674,706	———	7,208,566	———

The statistics in the following table show the total production of wire and fabricated wire products, except needles, pins, and hooks and eyes, as reported for 1929 and 1927. The figures for 1929 are preliminary and subject to revision.

Wire and Wire Products—Production, by Class, Kind, Quantity, and Value: 1929 and 1927 (Ton, 2,000 pounds)

Class and Kind	1929 Quantity	1929 Value	1927 Quantity	1927 Value
Wire and wire products, aggregate value	———	$884,460,174	———	$697,684,133
Made in—				
Wire mills (establishments drawing wire from purchased rods)	———	187,150,481	———	183,731,487
Wire-drawing departments of steel works and rolling mills	———	201,193,042	———	184,515,604
Wire-drawing departments of brass and copper rolling mills and other establishments	———	162,579,378	———	93,895,730
Establishments using purchased wire as material	———	333,537,273	———	235,541,312

IRON AND STEEL WIRE PRODUCTS

Class and Kind	1929 Quantity	1929 Value	1927 Quantity	1927 Value
Nails, brads, and spikes, kegs, (100 pounds), total 4/	13,513,959	$43,893,415	14,819,159	$48,002,203
Bright, not including galvanized or other coated, kegs (100 pounds)	10,393,116	31,257,553	(1)	(1)
Galvanized, kegs (100 pounds)	1,007,919	5,384,058	(1)	(1)
Cement coated, kegs (100 pounds)	2,112,924	7,251,804	(1)	(1)
Tacks, pounds 4/	6,324,945	617,171	7,134,501	690,796
Staples, pounds	52,213,955	1,952,724	49,379,225	1,596,600
Barbed wire, plain and coated, tons	221,809	13,824,143	201,708	12,973,239
Rope or cable, except insulated, reported with quantity, tons	153,304	46,876,871	160,783	43,642,992
Strand, galvanized, reported with quantity, tons	48,565	5,617,900		
Rope or cable, except insulated, and strand, reported without quantity	———	———	———	3,273,240
Poultry netting, reported with quantity, tons	46,733	7,536,147		
Woven-wire fence, except poultry netting, reported with quantity, tons	361,605	30,747,802	493,566	41,764,331
Poultry netting and woven-wire fence, reported without quantity	———	———	———	2,021,450
Fly screening, reported with quantity, pounds	64,728,176	9,942,027	68,754,115	10,752,609
Other wire cloth, reported with quantity, pounds	30,311,907	4,995,659		
Fly screening and other wire, cloth, reported without quantity	———	———	———	3,472,684
Other woven wire—				
Reported with quantity, tons	120,478	10,465,091	34,233	3,631,369
Reported without quantity	———	———	———	1,764,050
Bale ties, pounds	148,024,426	5,074,435	129,828,911	4,580,426
Wire springs, total value	(5)	**42,679,404**	(5)	**32,186,970**
Furniture and other upholstery (including mattress) springs, pounds	(5)	20,394,721	———	(1)
Valve springs for internal-combustion engines, pounds	(5)	3,314,728	———	(1)
Miscellaneous spiral springs, pounds	(5)	12,199,992	———	(1)
Flat springs, coiled, pounds	(5)	3,071,403	———	(1)
Other wire springs, pounds	(5)	3,698,560	———	(1)
Other fabricated iron and steel wire products 6/	(5)	46,368,910	———	41,868,597

NON-FERROUS WIRE PRODUCTS

Class and Kind	1929 Quantity	1929 Value	1927 Quantity	1927 Value
Nonferrous Wire Products:				
Fly Screening—				
Copper, pounds	4,993,338	$1,768,291		
Other metals, pounds	10,096,746	3,356,524		
Fourdrinier and cylinder wire cloth, pounds	2,321,149	3,938,659	———	$8,796,077
Other Wire Cloth—				
Copper, pounds	1,168,029	587,986		
Other metals, pounds	1,449,697	683,273		
Copper strand, except insulated, pounds	88,395,338	18,616,600	(1)	5,908,675
Other fabricated nonferrous wire products, except insulated wire—				
Copper, pounds	———	790,255	———	5,062,303
Brass and bronze, pounds	———	2,300,708	———	3,853,392
Other metals	———	252,965		
Fabricated wire products not distributed by classes shown above	———	———	———	1,435,852

INSULATED WIRE CABLE

Class and Kind	1929 Quantity	1929 Value	1927 Quantity	1927 Value
Insulated wire and cable, total value	———	$296,858,831	———	$210,047,947
Rubber Insulated—				
Lighting and power circuit—				
Braided	———	52,179,202	———	
Leaded	———	19,448,438	———	
Telephone	———	17,940,925	———	
Flexible cords (rubber insulation, cotton and silk covered)	———	15,706,157	———	
Cotton-insulated, weather-proof	———	42,041,680	———	
Cotton-insulated, slow-burning and asbestos insulated	———	6,188,470		(7)
Paper-insulated —				
Lighting and power circuit and telephone and telephone cable (including submarine)	———	90,677,240	———	
Varnished-cambric insulated	———	7,497,740	———	
Magnet—				
Cotton and silk covered	———	18,754,020	———	
Enameled	———	26,424,959	———	

Class and Kind	1929 Quantity	1929 Value	1927 Quantity	1927 Value
Wire Products—				
Total Value	———	$599,745,791	———	$487,325,802
Wire products, except insulated				
Wire and cable, total value	———	302,886,960	———	277,277,855
Insulated wire and cable	———	296,858,831	———	210,047,947

NOTES:

1/ No data.

2/ The wording of the inquiry concerning cold-rolled wire in the 1927 questionnaire permitted the inclusion of data for cold-rolled wire rolled direct from hot-rolling mills; figures for 1929 comprise only wire cold-rolled from drawn wire.

3/ Aluminum, bronze, nickel and alloys.

4/ Not including cut nails and spikes and cut tacks.

5/ Data incomplete.

6/ Among the principal items are wire guards, automobile and other chains, floral designs, wire lamp-shade frames, bird cages and garment hangers.

7/ Comparable figures for 1927 are not given because of the fact that manufacturers reported detail in different combinations from that reported in 1929. The detail for 1927 is shown in the June 1930, issue of WIRE & WIRE PRODUCTS.

The Development of Wire Rope, II

by Percy R. Clark*

History of Helicoidal Rope --The First Non-twisting Cable--Triangular and Elliptical Strands--Lang's Lay and Other Forms

(*Continued from page 483*)

MANY manufacturers are fond of strands with a center of 3 wires but the fundamental objection to this construction is that the 3 wires do not make a smooth center, so that the succeeding layer of 9 wires does not smoothly slide over it.

Fig. 20

Fig. 21

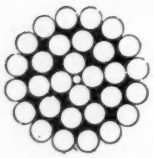


Fig. 22

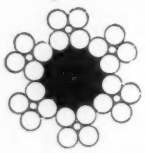


Fig. 23

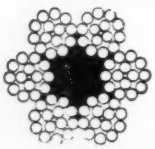


Fig. 24

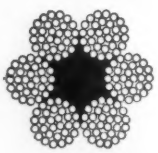


Fig. 25

Fig. 26

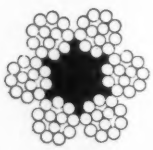


Fig. 27

For this reason strands of 12 wires, i. e., 9 over 3, or 27 wires, (15 + 9 + 3) are less flexible and more subject to internal friction. In this series we have strands of 12, 27, 48 and 75 wires.

When it is a question of a rope being more pliable as for instance for maritime purposes, where the rope has to be continually handled by sailors, it is the custom to put vegetable fibre into the center of the strands in place of wires, thus we get strands of 6 over fibre, 12 over fibre and 30 over fibre and so on.

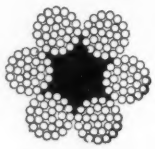


Fig. 28

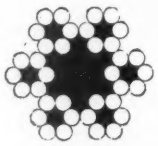


Fig. 29

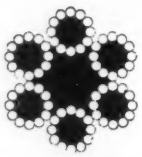


Fig. 30

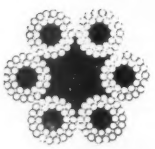


Fig. 31

On this point the author drew attention to two ideas which are often confused. There is the flexibility of a rope which represents the quality of the rope to withstand flexions over pulleys and drums. This depends entirely on the quality and thickness of the wire. Then there is the flexibility (which the author preferred to distinguish by the name of pliability) which permits the rope to be manipulated easily by hand in which case fibre centers in the strands help to give the desired effect. But fibre centers to strands of ropes working over pulleys will by no means make the rope more able to resist flexions. Such a rope simply has less tensile strength and less ability to resist lateral pressure.

Helicoidal Rope History

THE first helicoidal ropes were made with 4, 6 or 8 strands of four wires each. The first machine designed by Mr. Newall was for making ropes of 4 strands of 4 wires each. Some years passed before experience taught the wire rope makers and users the hexagon principle referred to by the author.

Of course there were, and are, a large number of deviations from this principle. Some arose from the necessities of special circumstances; others from the desire of wire rope manufacturers to do something different from their competitors.

Needless to say, hundreds of patents have been taken out for wire ropes, but in the present paper the author has only dealt with a few of the more interesting innovations. Examples of curiosities in rope patents are the following:

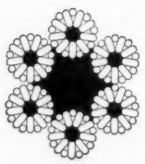


Fig. 32. Humble & Morrison in 1885

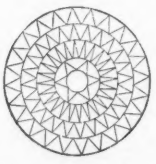


Fig. 33. L. Hill in 1886

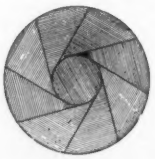


Fig. 34. Latch & Batchelor in 1886

*Societatea Anonima Anglia, Ploesti, Roumania. Abstract of paper read before Roumanian Branch, Inst. of Petroleum Technologist.

In view of the fact that a very large number of wire ropes work with a free end, during the whole history of the development of the wire rope industry there have been continual attempts to produce a rope which will remain perfectly dead. In 1875 Roebling of the United States and in 1876 Newall in England took up first letters patent for a 6-strand rope of which 3 of the strands were twisted in one direction and three in the opposite direction, i. e. 3 of the strands were cross lay and the other 3 Lang's lay. This innovation however made very little difference; the rope still had plenty of twist in it.

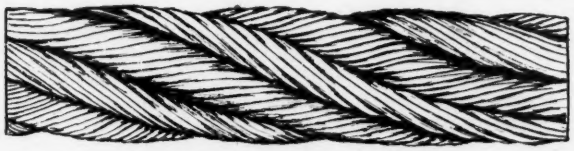
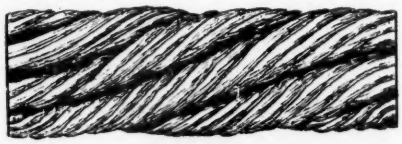


Fig. 35

Lang's Lay Patented in 1879

IN 1879 John Lang took out a patent in England for a rope in which all the strands and wires are twisted in the same direction. This type of rope has ever since been known by the name of Lang's lay.



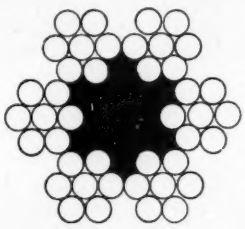


Fig. 36

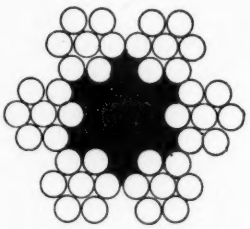


Fig. 37

The Lang's lay rope is particularly used in the forestry and mining industries for haulage and winding purposes, where of course both ends of the rope are invariably fixed. However, for working ropes which have a free end the Lang's lay is not suitable; it has too much a tendency to twist. In his specification, Mr. Lang claimed for his rope that a much greater proportion of the wire was exposed to an equal wear of friction and that the friction was not concentrated in the crown of each wire in the strand as in ropes then constructed, also that all wires in each strand were parallel to each other thereby preventing injury to the wires which each strand inflicts upon its neighbour by deep indentation in the course of working.

The first claim has been well justified in practice, but the second has hardly been realized.

In the year 1884, E. C. Batchelor received letters patent for the lock-coil rope. A patent was given to him for "a rope composed of various sections of wire which could be laid together in superposed layers or coils, the sections of the wires for the outside coils being such that they interlock with each other."

Production of the Non-Twisting Rope

THE object of the invention was to produce a rope which had a smooth exterior and would therefore not create vibration on the pulley. An interesting point is that although this lock-coil rope has practically no tendency to twist on its axis when left to hang free, nothing is said in the specification to the effect that the lock-coil rope was invented for its non-twisting qualities. Thus the long-sought non-twisting rope was produced unnoticed.

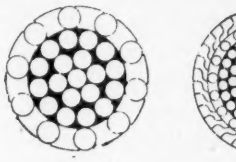


Fig. 38

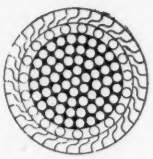


Fig. 39

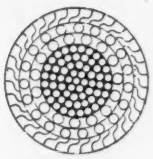


Fig. 40

Furthermore, the lock-coil rope gives very little elongation.

The negative part of this rope is that it cannot be spliced and a very slight movement between the layers of wires may open out exterior wires. For a long time lock coil rope enjoyed great popularity, more particularly as the standing cable for aerial ropeways, but of late years the so-called "spiral" rope. i. e. a strand of thick round wires, has been coming into its own again. Shaped wire cannot be drawn with the flexibility and toughness to which

(*Please turn to page 34*)

Wire in the New Tariff

Morris A. Hall

Specific Changes Made in Wire, Wire Machinery or Wire Mill Equipment, and in Wire Products--Workings of Flexible Provision

APPARENTLY the test of the tariff bill which went into effect last Summer depends largely upon the flexible provision. Judging from the requests for investigations of various products under this flexible provision, many such investigations are to be held.

Back in June, shortly after the tariff act had been passed, the Senate adopted a resolution by Senator Borah to provide an immediate test of the new flexible provisions. Under this resolution the tariff commission was directed to investigate and report to the Senate at the earliest possible date the differences in cost of production here and abroad of wire fencing, wire netting, hoes, shovels, forks, shoes, furniture, and a number of agricultural products.

The idea of this immediate test was to determine whether or not the flexible provision in the tariff act would have as beneficial effect as its sponsors had claimed.

Under date of November 5th, the first public hearing on wire fencing and netting was heard.

Among other things this was intended to consider a new classification for poultry wire, at specific duties of 90% ad valorem. As written by the Finance Committee this item would have read: "All wire fencing and all wire netting, whether galvanized or not, composed of wires smaller than .03 of 1 inch in diameter, 9/16ths of 1 cent per square foot. Provided, that all wire fencing and all wire netting whether galvanized or not, of a mesh 1½ inches or greater, composed of wire of a diameter not greater than .045 of 1 inch and not smaller that .03 of 1 inch, shall be subject to a duty of 5/16 of 1 cent per square foot".

Applications have also been listed with the Tariff Commission for investigations of umbrellas and parasols component parts of umbrellas and parasols, namely wire frames, cover and handle under date of July 2nd; Fourdrinier wires, etc., under date of July 11th; hot-rolled small diameter tubing (for increase of duty) under date of August 18th.

Representatives of manufacturers of Fourdrinier wire petitioned the tariff commission for an increase of duty from 50% ad valorem, on December 9th, under the Hawley-Smoot Tariff Act. to 65% ad valorem.

The domestic manufacturers were led by Carl E. Whitney, New York. The first witness called was Hamilton Lindsey, of the Lindsey Wire Weaving Co. "There are 25 manufacturers of this wire in the United States, all vitally interested in this cause," the witness declared. "Their total capacity is about 11,000,000 sq. ft. per year, but their actual production at this time is at the rate of about 5,691,000 sq. ft. This is based on the fact that there are a total of 460 looms available, of which 222 are now idle," he added.

The witness stated that the wire, which is used in the manufacture of paper, is vitally important and necessary to the country. He said further that a very small part of the cost of paper, however, is chargeable to the Fourdriner wire used in paper making. He said that figures submitted by 41 paper mills showed that the total amount of paper used in 365 issues of an average daily newspaper is made on wire that costs in the neighborhood of 5c.

There have been no increases in either foreign or domestic prices of the wire since the 50% duty was put into effect 6 months ago, according to Mr. Lindsey. He stated, however, that the domestic manufacturers have reduced their selling prices, and that it was reasonable to infer from this that importers have benefited by this reduction.

Foreign selling prices are about 23.8c per sq. ft. while domestic costs average about 42c to 47c a sq. ft. the witness asserted. He said that he gave as foreign selling prices figures quoted by the importers in a former brief, and that the foreign production cost was below this.

"In view of this wide differential in costs it seems entirely proper that the American industry should be given the 65% protection that it asks," he said.

Under questioning by Commissioner Coulter, the witness declared that American producers were able to take care of domestic requirements. He also said that the domestic and foreign products were comparable, and that the raw materials used in manufacture were practically the same the world over.

The next witness was John F. Curley, Holyoke, Mass., American Wire Weavers' Protective Association. He spoke in behalf of wages of the 500 members of his Association. On November 30th, only 340 were employed and of these 120 were working part time. Importing interests declared that a comparison of foreign and domestic costs would show that the present rates should be reduced instead of increased.

In addition to the tariff investigation, the Bureau of Standards is considering the establishment of a commercial standard for Fourdrinier wire cloth upon request from the Wire Cloth Manufacturing Association.

The proposed standard is intended to serve as a basis of common understanding as to criterial between the producers and users of this type of wire cloth. By this method it is hoped that misunderstandings between buyer and seller may be avoided, and the waste and expense incident thereto may be eliminated. According to present plans, the standard will cover nomenclature and definitions, grading rules, kinds of wire to be used, sizes of wires and openings, physical requirements for wire, and recommended standard practices in the handling, installation, and use of this commodity.

In the tariff the following paragraphs are of interest to the wire industry:

Par. 372. Knitting, braiding, and insulating machines, and all other similar textile machinery, finished or unfinished, not specially provided for, 40 per centum ad valorem; all other textile machinery, finished or unfinished, not specially provided for, 40 per centum ad valorem; punches, shears, and bar cutters, intended for use in fabricating structural or other rolled iron or steel shapes, 40 per centum ad valorem; all other machines, finished or unfinished, not specially provided for, 27½ per centum ad valorem: Provided, That parts, not specially provided for, wholly or in chief value of metal or porcelain, of any of the foregoing, shall be dutiable at the same rate of duty as the articles of which they are parts: Provided further, That machine tools as used in this paragraph shall be held to mean any machine operating other than by hand power which employs a tool for work on metal.

Par. 381. Copper in rolls, rods, or sheets, 2½ cents per pound; copper engravers' plates, not ground, and seamless copper tubes and tubing, 7 cents per pound; copper engravers' plates, ground, and brazed copper tubes, 11 cents per pound; brass rods, sheet brass, brass plates, bars, and strips, Muntz or yellow metal sheets, sheathing, bolts, piston rods, and shafting, 4 cents per pound; seamless brass tubes and tubing, 8 cents per pound; brazed brass tubes, brass angles and channels, 12 cents per pound; bronze rods and sheets, 4 cents per pound; bronze tubes, 8 cents per pound.

Par. 382. (a) Tin foil less than six one-thousandths of one inch in thickness, 35 per centum ad valorem; aluminum foil less than six one-thousandths of one inch in thickness, 40 per centum ad valorem; bronze powder not of aluminum, 14 cents per pound; aluminum bronze powder, powdered foil, powdered tin, flitters, and metallics, manufactured in whole or in part, 12 cents per pound; bronze, or Dutch metal, or aluminum, in leaf, 6 cents per one hundred leaves; bronze powder, or Dutch metal powder, or aluminum powder, in leaf, 6 cents per one hundred leaves and 10 per centum ad valorem. The foregoing rates on leaf apply to leaf not exceeding in size the equivalent of five and one-half by five and one-half inches; additional duties in the same proportion shall be assessed on leaf exceeding in size said equivalent.

(b) Stamping and embossing materials of bronze powder, or Dutch metal powder, or aluminum powder, mounted on paper or equivalent backing, and releasable from the backing by means of heat and pressure, three-eights of 1 cent per one hundred square inches.

Par. 314. Hoop or band iron, and hoop or band steel, cut to lengths, or wholly or partly manufactured into hoops or ties, coated or not coated with paint or any other preparation, with or without buckles or fastenings, for baling cotton or any other commodity, one-fourth of 1 cent per pound.

Par. 315. Wire rods: Rivet, screw, fence, and other iron or steel wire rods, whether round, oval, or square, or in any other shape, nail rods and flat rods up to six inches in width ready to be drawn or rolled into wire or strips, all the foregoing in coils or otherwise, valued at not over 4 cents per pound, three-tenths of 1 cent per pound; valued at over 4 cents per pound, six-tenths of 1 cent per pound: Provided, That all round iron or steel rods smaller than twenty one-hundredths of one inch in diameter shall be classified and dutiable as wire: Provided further, That all iron or steel wire rods which have been tempered or treated in any manner or partly manufactured shall be subject to an additional duty of one-fourth of 1 cent per pound: Provided further, That on all iron or steel bars and rods of whatever shape or section which are cold rolled, cold drawn, cold hammered, or polished in any way in addition to the ordinary process of hot rolling or hammering, there shall be paid one-eighth of 1 cent per pound in addition to the rates provided on bars or rods of whatever section or shape which are hot rolled; and on all strips, plates, or sheets of iron or steel of whatever shape, other than polished, planished, or glanced sheet iron or sheet steel, which are cold hammered, blued, brightened, tempered, or polished by any process to such perfected surface finish or polish better than the grade of cold rolled, smoothed only, there shall be paid two-tenths of 1 cent per pound in addition to the rates provided on plates, strips, or sheets of iron or steel of common or black finish of corresponding thickness or value.

Par. 316. (a) Round iron or steel wire, not smaller than ninety-five one-thousandths of one inch in diameter, three-fourths of 1 cent per pound; smaller than sixty-five one-thousandths of one inch in diameter, 1¼ cents per pound; smaller than sixty-five one-thousandths of one inch in diameter, 1½ cents per pound: Provided, That all the foregoing valued above 6 cents per pound shall be subject to a duty of 25 per centum ad valorem; all wire composed of iron, steel, or other metal, not specially provided for (except gold, silver, platinum, tungsten, or molybdenum); all flat wires and all steel in strips

(*Please turn to page 31*)

Wire Questions and Answers

Question No. 1--Gages ▼▼▼▼

From John Mordica
Bethlehem Steel Company,
Maryland Plant,
Sparrows Point, Md.

The Wire Association:

The Wire Association should undertake the standardization of wire gages. Instead of the multitude of gages now in use, one set of standards in one plant, another standard in another plant, one should be adopted. The Wire Association is the place to start this idea.

From E. H. Webb,
Webb Wire Works
New Brunswick, N. J.

The Wire Association:

For a number of years we have been using a chart in laying out drafting, heat treating and in general to determine tensile strength and reduction of area during processing of the various wires that we manufacture. The chart is based on a numbered gage in which an increase in ten gage numbers gives a wire whose area is 1/10th of the first wire. Further, an increase in twenty numbers corresponds to a wire whose area is 1/100th of the first wire and whose diameter is 1/10th of the same wire. For example,

No. 2 equals .2526 diam., .05118 area, 5.87 ft. per lb.; No. 12 equals .07988 diam., .005118 area, 58.75 ft. per lb.; No. 22 equals .02526 diam., .0005118 area, 587.5 ft. per lb.; No. 32 equals .00798 diam., .000051118 area, 5,875.3 ft. per lb.

The percentage of reduction in area between consecutive gage numbers is the same and the percentage of reduction of area between any number of gages is always the same. For example, the percentage of reduction of area in one gage is 20.568 (20.6) and in six gage numbers the reduction of area is always 74.892 (74.9) which equals a wire whose diameter is approximately ½ that of the original wire.

Using the chart for copper wire or wire made of other metals, it would be necessary to change the table of feet per pound to correspond to the density of the metal in question. We understand that the recently organized Association of Wire Mfrs. has appointed a committee on gages to which we suggest you send this letter and chart.

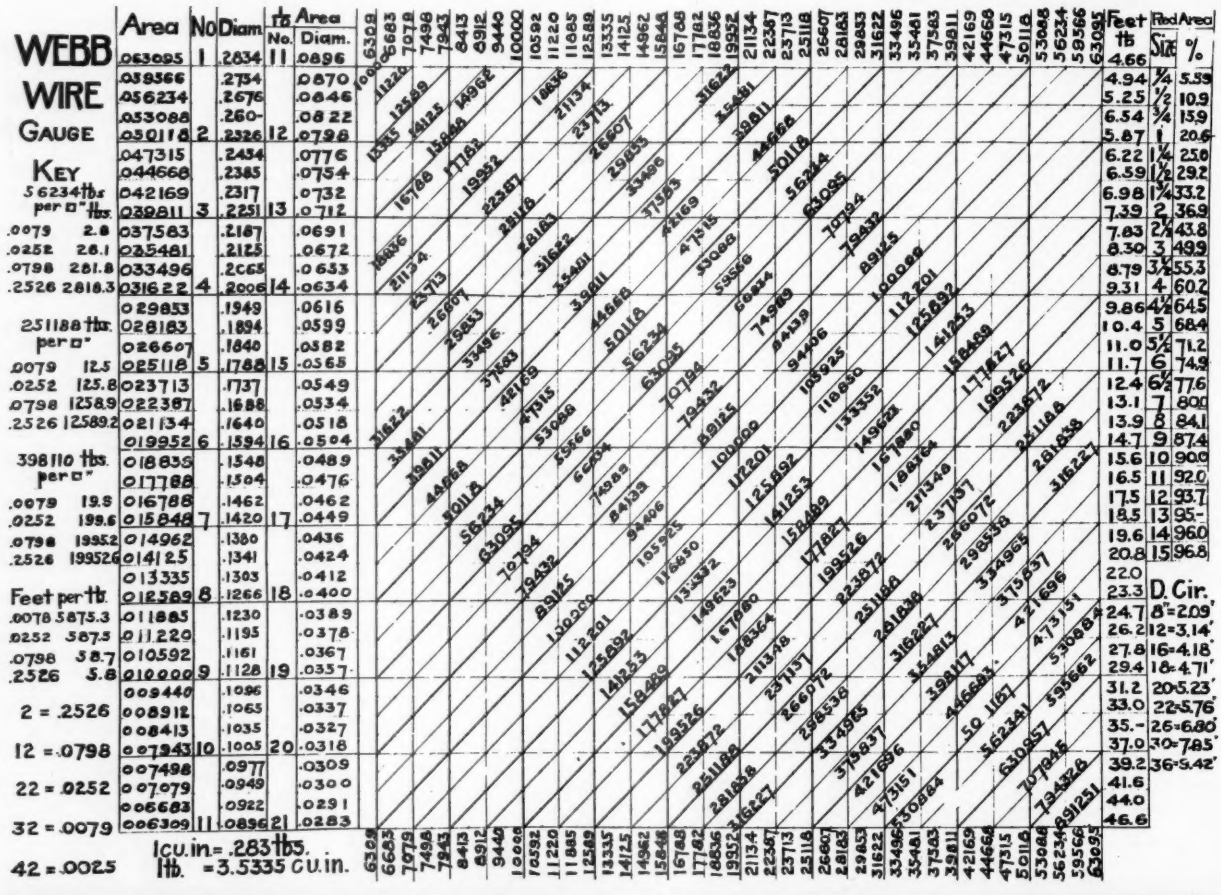
Several years ago a subscriber named Rawson suggested to the editor of WIRE AND WIRE PRODUCTS new wire sizes with uniform differences. This regular variation in diameters followed somewhat closely the plan for a series of wire sizes as brought out by the Trenton Iron Co. some years ago, this table being given herewith. Notice the largest sizes varied by 50 thousandths, the next ones by 40, then by 30, and so on down to the smallest, some 7 or 8 of which varied by ½ (or 5/10,000). This plan is practically the same as that suggested by Mr. Rawson.

From Kenneth B. Lewis,
Morgan Construction Company
Worcester, Mass.

The Wire Association:

The Webb chart is ingeniously worked out but I am opposed to any system of gage numbers. If numbers must be used to indicate wire sizes, I don't see how we can do better than to use numbers which indicate the diameter of the wire in inches. The practice of ordering wire to decimal sizes rather than to wire gage numbers is steadily gaining ground and I have noticed from year to year that mills are slowly bending in that direction.

Gage numbers of all kinds are a



nuisance. Even if it were possible for all wire makers including the non-ferrous and all the sheet makers and the screw makers, the makers and users of piano wire and various other products in which special gage numbers are used, to agree upon a single system of gage numbers which I think extremely doubtfull, I do not see where this system would have an advantage over decimals. In fact it would be simply something else to learn and get accustomed to whereas the decimal system is already established side by side with the patchwork gage systems.

Gage numbers are entirely meaningless with the possible exception of the Brown & Sharpe system. Originally they had a meaning. Number 1 gage was the result of the first normal draft from what was at that time a standard rolled rod. Number 2 represented the second draft and so on. The reduction from gage number to gage number varies in the wildest sort of way corresponding to the superstition current at the time regarding the proper drafting of steel wire. Since that time heavier machinery, better dies and particularly a tougher and more homogeneous raw material have completely upset the system. The only virtue of any gage system now is that for each one there is a large group of people who have become accustomed to it.

If the present gage systems are upset, I certainly hope that no serious attempt is made to substitute another system.

From Fred M. Crapo,
Indiana Steel & Wire Company
Muncie, Ind.

The Wire Association:

It is a good idea to have a committee for the purpose of investigating the present wire gages in use, with the idea in mind to standardize certain of these gages, however, it is very doubtful as to whether or not much of constructive nature could be accomplished by such a committee, this, on account of the fact that the present practice is the result of many years of actual use of the various gages for particular purposes.

In a measure, an attempt was made to take a step towards standardizing certain gages in connection with galvanized wire, during some of the recent meetings of the specifications committee of the American Society for Testing Materials, but it was unsuccessful.

In most instances the diameters of wire which have been more or less determined by practice, involve also the use of fittings, engineering data, etc., which are so well established that a change in diameter would involve a considerable cost to the consumer who as a rule does not believe it is justified in view of the slight advantages gained for the manufacturer by standardizing the different wire gages.

From I. J. Fairchild
Division of Trade Standards
Department of Commerce
Washington, D. C.

The Wire Association:

The American Standards Assn. has under way a project for the standardization of wire and sheet metal gages, sponsored by the American Society of Mechanical Engineers and the Society of Automotive Engineers.

It is our understanding that this project is considered as under way and that no proposed draft has been submitted to the Sectional Committee as yet.

From R. S. Burnett, Manager
Standards Department
Society of Automotive Engrs. Inc.,
29 West 39th Street
New York, N. Y.

Abstract of minutes, of meeting of A. S. M. E. Sectional Committee, November 27, 1928. The following memorandum were distributed at the meeting, to the members of the Sectional Committee on Wire and Sheet-Metal Gaging Systems. The meeting was held at the United Engineering Societies Building, New York, November 27, 1928.

(a) Memorandum of proposed system of wire and sheet-metal sizes by Colonel E. C. Peck, and other correspondence.

(b) A. E. S. C. publication Z17—1927 on Preferred Numbers.

(c) Bureau of Standards Letter Circular No. 24.

In connection with the appointment of the Technical Committees as recorded in the enclosed Memorandum, it was felt that the members of the Sectional Committee thereon should accept the appointments as a part of their responsibility as members of the Sectional Committee, towards developing that phase of the project in which is was believed they are more directly interested. It is only by accepting such responsibility and serving on Technical Committees that the members of the Sectional Committees that the members of the Sectional Committee as a whole may expect to carry the entire project to a successful conclusion.

There is enclosed also a return form on which the members of the Sectional Committee are requested to indicate their approval or disapproval of the action taken by the meeting as recorded

(*Please turn to page 26*)

Five Widely-Used Standard Wire Gages.

No. of Wire Gage	Am. Steel & Wire Co.'s Steel Wire Gage	American Standard (B.&S.)	Birmingham or Stubs	British Imperial Standard*	Old English or London
0000000	.4900	.....	.....	.500	.....
000000	.4615	.58000	.....	.464	.....
00000	.4305	.51650	.500	.432	.....
0000	.3938	.46000	.454	.400	.4540
000	.3625	.40964	.425	.372	.4250
00	.3310	.36480	.380	.348	.3800
0	.3065	.32486	.340	.324	.3400
1	.2830	.28930	.300	.300	.3000
2	.2625	.25763	.284	.276	.2840
3	.2437	.22942	.259	.252	.2590
4	.2253	.20431	.238	.232	.2380
5	.2070	.18194	.220	.212	.2200
6	.1920	.16202	.203	.192	.2030
7	.1770	.14428	.180	.176	.1800
8	.1620	.12849	.165	.160	.1650
9	.1483	.11443	.148	.144	.1480
10	.1350	.10189	.134	.128	.1340
11	.1205	.09074	.120	.116	.1200
12	.1055	.08081	.109	.104	.1090
13	.0915	.07916	.095	.092	.0950
14	.0800	.06408	.083	.080	.0830
15	.0720	.05706	.072	.072	.0720
16	.0625	.05082	.065	.064	.0650
17	.0540	.04525	.058	.056	.0580
18	.0475	.04030	.049	.048	.0490
19	.0410	.03589	.042	.040	.0400
20	.0348	.03196	.035	.036	.0350
21	.0317	.02846	.032	.032	.0315
22	.0286	.02535	.028	.028	.0295
23	.0258	.02257	.025	.024	.0270
24	.0230	.02010	.022	.022	.0250
25	.0204	.01790	.020	.020	.0230
26	.0181	.01594	.018	.018	.0205
27	.0173	.01420	.016	.0164	.01875
28	.0162	.01264	.014	.0148	.01650
29	.0150	.01126	.013	.0136	.01550
30	.0140	.01003	.012	.0124	.01375
31	.0132	.00893	.010	.0116	.01225
32	.0128	.00795	.009	.0108	.01125
33	.0118	.00708	.008	.0100	.01025
34	.0104	.00630	.007	.0092	.00950
35	.0095	.00561	.005	.0084	.00900
36	.0090	.00500	.004	.0076	.00750
37	.0085	.00445	.....	.0068	.00650
38	.0080	.00396	.....	.0060	.00575
39	.0075	.00353	.....	.0052	.00500
40	.0070	.00314	.....	.0048	.00450

NEWS of the WIRE INDUSTRY

Netting Manufacturers Stabilizing Prices

END of December negotiations were started in London between the British and the German wire netting manufacturers' associations with the purpose of etstablishing uniform prices for a number of markets, among which were Canada and South Africa. The price-lists in both countries are the same, but discounts differ.

All efforts of the German wire rope manufacturers' cartel to get the more important outsiders to join were abortive and will not be continued in the near future.

The wire prices have gone further down. In November the total export business in October-November was approximately 25% smaller than last year, but towards the end of November more orders had been placed, especially for wire netting and fencing wire and for December a further improvement is anticipated. The prices were as follows: Wire nails £5. 7. 6, bright wire £ 5. 5. 0 galvanized wire £ 6. 15. 0 annealed wire £ 5. 15. 0 barbed wire BWG 12 £ 9. 2. 6 and BWG 14 £ 10. 1. 0. The extras for thin wires are also much lower and the discount is increased up to 15% on the regular prices. The German domestic prices are also reduced up to 12%, for wire nails up to 15%. America is buying wire netting and wire ropes in satisfactory quantities, but less wire nails and tacks. The German wire netting syndicate has now accepted also the last of the outsiders being thus entirely complete. The wire rod price for the United States is now only $30.25-30.50 p. ton cif.

The Japanese industry has established in South Africa the Nippon Sewing Needle association and the Nippon Wire nail producers' association and a keen competition is expected to result from the Japanese efforts to sell wire products in S. Africa.

The order placed by the South African Iron & Steel Industrial Corporation with the DEMAG for machinery includes also a complete wire rod rolling mill for a capacity of 20,000 tons annually, so that Africa will be able to produce a part of her own wire rod requirements.

Exports of wires were only 19.975 tons in October, wire nails 4.577 tons, all other wire products (netting, gauze, ropes, etc., etc., 11.654 tons, a decline of 32% compared with 1929, and amounted to only 34% of the record export figure of May, 1929, when over 100,000 tons of wire and wire products were sold for export.

The makers of square wire netting have now also established an export organization and will try to arrange prices and export allotment with the French and Belgian industry. All principal German producers are members of the association.

American and German manufacturers of wire gauze, especially mosquito mesh have riscussed an agreement concerning division of markets in the Far East and South Africa. It seems however that no positive result came from these negotiations, that however a uniform price policy had been agreed. The German wire mesh prices are now the same as the American, except for brass and copper mesh, in which the German prices are still cheaper. This agreement however concerns only hard mesh and not the soft (Indian) mesh, in which the Austrian and Czechoslovakian competition is very keen.

New Zealand Places Big Order

The well-known electrical wire manufacturing firm of Frederick Smith & Co., Salford, has just received an order to supply approximately 400 miles of bare hard-drawn copper strand for overhead electric power transmission for the Wanganui (New Zealand) power scheme. The total weight of bare copper strand will be over 560 tons and the whole process of manufacture will be carried out at the firm's Salford works.

Japan Planning New Wire Rod Mill

The Kawasaki Dockyard Co., Kobe, Japan, and another Japanese steel producer are inquiring for wire rod mills, which will add 40,000 tons to the annual capacity of Japan. Orders for this equipment are expected to be placed with German makers soon, despite the adverse attitude of the present Japanese government toward a further increase in duties on wire rods to protect the industry.

British Wire Merger Nets $9,832,533.

The first report of Imperial and International Communications, Ltd., the British telegraph and cable merger, covering the last nine months of 1928 and the whole of 1929, shows gross profits amounting to £11,381,262 (£ equals $4.86), according to a British press report received in the Department of Commerce.

Working expenses, administration, charges, taxation, rentals, directors' fees, etc., absorbed £9,357,107, leaving a net profit of £2,023,155, or £708,912 less than the standard revenue above which 50 percent of the surplus has to be passed on to the users of the system. It is stated that this rate of profit (about £1,156,000 per annum) is not expected to be maintained during the current year. The report says that considerable economies have been effected and further savings will be made. Reference is made to what is described as the unfair competition of the post office in the matter of overseas telephony.

Wire Sales High In Canada

Sales from the wire and wire goods industry in Canada during 1929 were valued at $21,647,273,

according to a statement issued by the Dominion Bureau of Statistics at Ottawa. This total was 15% over the 1928 output of $18,847,346 which in turn was 13% better than the total of $16,725,865 in 1927.

During 1929, a total of 60 plants in Canada reported wire or wire goods as the main products; 36 were located in Ontario, 11, in Quebec, 6 in British Columbia, 4 in Manitoba, 2 in New Brunswick, and 1 in Nova Scotia. These establishments employed a capital of $37,528,215, gave work to a monthly average of 4,190 people throughout the year, paid out the sum of $5,094.656 in salaries and wages, and purchased materials for manufacturing at a cost of $9,777,818 at the works.

During the calendar year 1929 the imports of wire (including wire nails) were valued at $3,875,371 and included wire rope and wire for rope making at $1,644,857, woven wire and wire cloth or netting at $668,323, galvanized iron or stel wire for use in telegraph or telephone lines at $360,178, barbed fence wire, at $297,883, and other items of lesser importance. Exports during the same period totalled $1,187,885 and included wire nails valued at $211,265, woven fire fencing at $127,879, barbed wire at $110,385, and other wire of iron and steel at $738,356.

Reorganization Planned For Big Cable Firm

The India Rubber, Gutta Percha & Telegraph Works Co., Ltd., has fallen upon very lean times, but when the present scheme of drastic organization and reconstruction has been completed, the share holders should be able to rely upon a return of prosperity. The results for the year ended August 31, shows a loss, after making provision for depreciation, of £95,978 ($479,890). From this is deducted the credit balance brought in of £52,983 ($244,915). The Ordinary dividend paid on December 1, 1929, absorbed £18,750 ($93,750), and the Preference dividends paid in January and July last absorbed £10,417 ($52,085), leaving a debit balance of £72,162 ($360,810) to be carried forward.

A very large proportion of the loss last year was due to the writing down of raw materials and stocks to the low values now ruling. Early in the year the directors, realizing the downward trend of trade conditions, decided upon a policy of "drastic reorganization." Costs of production have already been lowered by substantial economics in overhead charges, and the selling organization has been strengthened with results that are already apparent. The directors admit that the reorganization is entailing considerable hardship to employees, but they are treating them as generously as the slender funds of the company permit. Naturally they cannot sanction the payment of the Preference dividend on January 1, 1931, but they are satisfied that the steps now being taken will materially improve the company's position. The balance-sheet shows that the floating assets amount to £674,525 ($3,372,625), while the current liabilities are only £136,724 ($683,620). A year ago these items were £827,558 and £149,008 ($4,137,790 and $745,040) respectively. The gross profit for the year was £96,702 ($483,510), against £208,396 ($1,041,980) in 1928-29. The allowance for depreciation is £39,017 ($195,085), against £34,210 ($171,050).

COMING EVENTS

Dec. 29—Jan. 3, 1931—Association for the Advancement of Science, Cleveland, Ohio.

Jan. 26-30, 1931—American Institute of Electric Engineers. Annual winter convention, New York. F. L. Hutchinson, 33 West 39th St., Sec'y.

Feb. 16-20, 1931—Western Metal Congress. Second National Western Metal Congress and Exposition, Civic Auditorium, San Francisco, American Society for Steel Treating. W. H. Eisenman, 7016 Euclid Ave., Cleveland, sec'y.

Jan. 12, 1931—New York Chapter American Society for Steel Treating, New York, N. Y.

Jan. 26-27, 1931—Society for Electrical Developments, 4th Midwinter Conference, Chicago, Ill. O. C. Small, Sec'y., 420 Lexington Ave., New York, N. Y.

Feb. 10-24, 1931—American Society of Mechanical Engineers, 4th National Fuels meeting, Chicago, Ill. Also 5th Midwestern Power and Engineering Exposition. Calvin E. Rice, Sec'y., 39 W. 39th St., New York, N. Y.

May 18-23, 1931—National Electric Light Association Annual Convention, the Homestead, Hot Springs, Va.

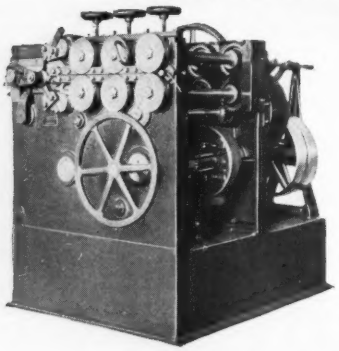
Foreign Trade Opportunities reported by the Bureau of Foreign and Domestic Commerce during the month of December include inquiries for wire or wire products from the following sources: Electric wires and cables (48559) Buenos Aires, Argentina; pins and needles (48610) Milan, Italy; noncorrosive and very flexible steel bands (48551) Prague, Czechoslovakia; barbed wire (48582) Rio de Janeiro, Brazil; steel wire rope (48608) Belgrade, Yugoslavia; weaving and spinning machinery (48612) Milan, Italy; copper and tin scrap metals (48591) Lubeck, Germany; bolts and nuts (48654) Johannesburg, South Africa; barbed wire (48734) Mossoro, Brazil; wire mesh (48690) Alexandria, Egypt; lead tubes (48677) Montreal, Canada; copper wire bars (48679) Cogoleto, Italy; brass eyelets (48750) Calcutta, India; electric wire supplies (48773) Lourenco Marques, Portuguese East Africa; electric wringers (48861) Christchurch, New Zealand; cement coated nails (48865) Jaffa, Palestine; nail and screw making machinery (48866) Mexico City, Mexico; concrete reinforcing bars (48951) Rio de Janeiro, Brazil; bolts and nuts (48953) Habana, Cuba; barbed wire (48934) wire cloth (fanning-mill grade) (48910) Calgary, Canada; mining equipment (48916) Casablanca, Morocco; wire-welding machinery (48959) Warrington, England; household electrical appliances (49043) Casablanca, Morocco; welding wire (49078) Berlin, Germany.

COVERING THE FE

Sleeper & Hartley TRADE MARK

Illustrated and described below are the most popular types (Spring
In addition to this line of machines, the prospective Spring (ing or
that we also manufacture Single Hole and Continuous Wire Dr ng Ma
ment, together with a complete group of Wire Armoring. Flex Cable
These machines can not be overlooked by the alert Purcha g Agen
manufactures some 70 other special machines suited to a variety wire c

Universal Spring Coiling Machines



For two decades our Universal Spring Coiling Machines have been the World's standard. As yet their speed of production and accuracy of work is unapproached by competition.

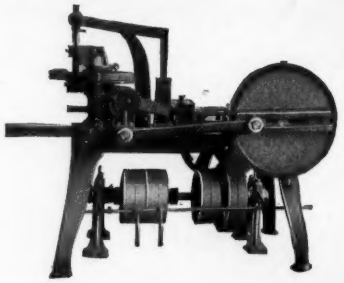
Built in 11 sizes, these machines coil cold, oil-tempered wire from .004" to 5/8" diameter. They make a wide variety of spring forms at high speeds, and will close the spring ends automatically, doing away with expensive hot pressing.

In addition we are ready to supply at short notice Spring Setters which will care for any of the springs produced by the machines above. We also make a Spring Hooker in four sizes which forms loops and hooks, and is readily adjustable to take a wide range of wire sizes.

—o—

Torsion Spring Winding Machines

Our Torsion Spring Winding Machines are made in five sizes, having a range from No. 29 to 3/8" wire. These machines will wind long lengths of wire, will leave one or both ends extending from the spring in any predetermined direction, and in some cases, will form these ends into crimps or hooks. Changes from one spring form to another with small tool charge.



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Coiling Machines for Special Springs

In addition to our line of Universal Spring Coiling Machines, we build a group of Special Spring Coiling Machines and also stand ready to construct on order added machines to do specialized work. We can supply from stock Special Coilers to make fine helical forms in long lengths, choke and other small casings of various kinds, lamp necks, square and rectangular springs, resistance coils of alloy wires, and such fine tungsten coils as are used in electric light bulbs.

American Agents

NEW YORK TERRITORY—Triplex Machine Tool Co.
PHILADELPHIA TERRITORY—Swind Machinery Co.
CHICAGO TERRITORY—Neff, Kohlbusch & Bissell, Inc.
SAN FRANCISCO—L. G. Henes Machine Tool Division of Jenison Machinery Co.
LOS ANGELES—L. G. Henes Machinery Co.

SLEEPER & HA

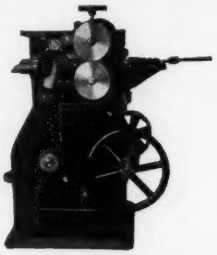
WORCESTER MASS.

FELD COMPLETELY

pes Spring Coiling and Winding Machines made by our Company.
ng ing or Wire Drawing machinery buyer should bear in mind
Dr ng Machines in all sizes, an entire line of Wire Mill Equip-
Flex e Cable and Casing Coiling Machines.
rcha g Agent, who should also bear in mind that this company also
riet wire coiling problems. Let our experts advise you.

Sleeper & Hartley
TRADE MARK
REG U.S. PAT. OFF. & PRINCIPAL FOREIGN COUNTRIES

Upholstery Spring Coiling Machines



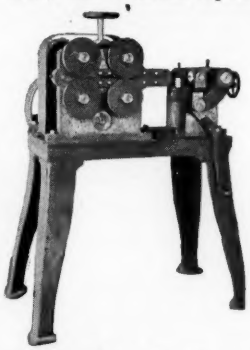
We have developed two high-production machines for the manufacture of the coil springs used in upholstery work. The first of these is the Furniture Spring Coiling Machine which handles a heavy grade of oil-tempered wire. The second is the Marshall Spring Coiling Machine, producing the type of spring so widely used in cushions and fine chairs. Both of these machines are without peers as to speed and accuracy of production, and both will make straight-side, cone, and hour-glass spring forms.

We also supply, as adjuncts to these machines, powerful, accurate and speedy Spring Setters and Knotters.

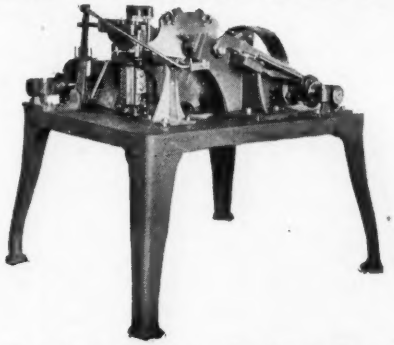
—o—

Helical Bed Spring Equipment

Meeting a special demand, this Helical Bed Spring Coiling Machine, when used in conjunction with the Helical Spring Cutting and Hooking Machine, is capable of producing 4000 pounds of springs, ready for baking, daily.



The product of a long period of experiment, this coiler is widely known in the Trade as a rapid and powerful machine. It will coil No. 11 wire into a ¾" coil at 2500 turns a minute. This is the only machine on the market which will keep up with the production demands of Cutting & Hooking Machine shown at the right.



This Cutter and Hooker will produce springs from 6 to 24 coils, taking any length of coil produced by the Coiler. It will allow for "crawl" in the spring during the baking process, and hooks may be set at right angles to each other. Each spring is accurately measured, the machine being noted for its extreme accuracy and reliability.

HARTLEY, INC.
ERMASS., U. S. A.

Foreign Agents

UNITED KINGDOM—Mr. Fredk. A. Perry, 63 Queen Victoria St., London, E. C. 4

MONTREAL AND TORONTO—Arthur Jackson Machine Tool Co.

AUSTRALIA AND NEW ZEALAND—Edwin Wood Pty. Ltd., Melbourne

JAPAN—Andrews & George Co., Tokyo

No Rejects

Personalities and Gossip of the Wire Industry as Told by a Roving "Trouble Shooter" ▼▼▼▼▼▼▼

THE old story about the one-armed paper hangar is particularly apt in discussing the activities of your trouble-shooter friend this year. He has stamped all over the United States and Canada with "Seven League" boots and at the close of the year he feels that his work has just begun. Everywhere the wire industry, both steel and non-ferrous is expectantly awaiting the increase in business which all optimists confidently predict. It has been amusing to note on various call-backs the change in attitude on the part of those who are saddled with the destinies of their firms. One substantial order has been sufficient to make a man believe that the upturn is just around the corner. One day of limited activity has been more than enough to mire him in a "Slough of Despond". As you will recall, our good friend Christian in "Pilgrim's Progress" was beset with many difficulties in his course to the "Holy City" of better business. Mister-facing-both-ways, should in the ordinary course of the pick-up, have a pretty good general view of what has taken place. But in my mind those who have faced only one way, and that direction ahead, laying foundations for more efficient production of their wares, instilling their sales forces with the idea that after all a salesman is a real factor in the economic machine, and therefore must produce; these, and their kind will reap the harvest that is being sowed in limited consumption.

It may be speaking out of turn at this junction to mention Walter Smith of the Chase Co.'s new mill at Cleveland. It is difficult to envision a man so wrapped in his work, so proud of his job, and so progressive. Sometimes it seems to me that he operates by formula; considering that history is valuable only in fundamentals and that all the cobwebs that are spun in the forward movement of any industry, must from time to time be swept clean. History, not fundamental and more than 5 years old, is by him consigned to the rubbish heap. A new deal every 5 years; the answer is progress.

At the first meeting of the "Wire Association", it was decided that the association should act as a clearing house for ideas. The fact that I am not a member of the Wire Association, should not permit me to speak or be critical of it, but it is a guess of mine that if all the members representing the various firms which produce wire were permitted to go through each other's mill, that they would learn little that they are not doing, or would like to do in their own. But I believe that following such an open and aboveboard interchange of view points, a renaissance in the manufacture of wire would more than likely follow.

My ideas may seem those of the idealistic tyro. I have seen enough however to feel that the industry is on the verge of very definite and very progressive changes. Brush away some of the cobwebs and cast off some of the shackles and realize that this is the twentieth centry, and that 30 years of it have gone by, and in many instances we are still using equipment and methods that were old fashioned in the early nineties.

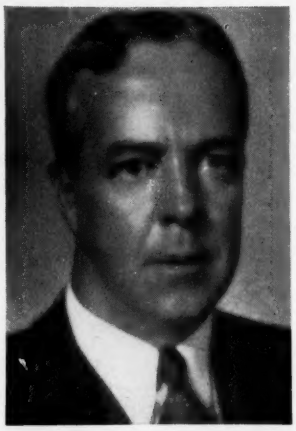
If I wanted some dope or wanted to be pepped up by the possibilities of a business which was my life work, I think that every now and then I would apply at the administration building of the Rouge Plant of the Ford Co. for a pass to go through their wire mill. I would write to McKean of the American Electrical Works at Phillipsdale, R. I., and persuade or conjole him into permitting me to inspect their magnificent layout. I wouldn't for a minute overlook asking Nullmeier of the Youngstown Sheet & Tube to inject me with some of the serum that has counter acted the "animus lethargica" which is so apt to slow up men who have vainly fought for improvements in mills.

Jones & Laughlin at both their Aliquippa and Hazelwood Works have literally "whole bags of tricks" not particularly unusual in themselves, but of such a character to indicate definite progressivism.

A good man to contact from time to time would be Mr. F. Ingraham, and if he will but impart a mead of his own driving dynamic spirit and personality, the effort will have been more than worth itself. Multiply Ingraham by twenty times and add one or two Blackmers, and the American Steel & Wire Co. would have a rejuvenation, which would shake the industry from stem to stern.

Get out and talk to that hard riding bunch of Sommers at Keystone in Peoria. On your way back don't miss Northwestern Barbed Wire at Sterling; don't overlook Crapo at Crawfordsville, Indiana, or the International Nickel Co., at Huntington, West Virginia. Then go back and go to work, and if the trip hasn't paid for itself many times over, not only in new ideas, but in the fostering of a new spirit which will bring about increased efficiency in your own mill, then I am "all wet."

Outstanding Wire Industry Personalities



H. G. BATCHELLER

HILAND G. BATCHELLER is now president of the Ludlum Steel Co., succeeding Edwin Corning, who becomes chairman of the board. Mr. Batcheller was born in New York in 1886, graduated from Wesleyan in 1907, started with the Carnegie Steel Co., in New York, but was transferred to Pittsburgh so he could go through the Carnegie training school. On Jan. 1, 1916, he became assistant to the president of Ludlum, and in 1919 was elected vice president.

He is a member of the Amer. Iron & Steel Inst., Amer. Soc. of Steel Treaters, Fort Orange Club (Albany), Schuyler Meadows Club (Albany), and Laurentian Club (Lac la Peche, Quebec). And director of Krupp Nirosta Co. Inc., New York; and president and director, Associated Alloy Steel Co. Inc., Cleveland.

E. P. JACOBS

E. P. Jacobs came up from the ranks to be superintendent of a department of one of our larger steel corporations. He served his apprenticeship as a tool and die maker with the Westinghouse Machine Co. some 30 years ago. Since then he has been with the American Locomotive Co., Mesta Machine Co., Haines Automobile Co., Peerless Drawn Steel Co., Timken Roller Bearing Co., Cuyahoga Steel & Wire Co.and for the past 6 years has been superintendent, Cold drawing and heat-treating departments, Central Alloy Steel Co., now a division of Republic Steel Corp.

Well- and widely-known in the various wire centers of the country, Mr. Jacobs finds his diversions in golf, fishing, and his pet dogs.

C. E. Brodhead, for more than 25 years prominent in the bolt and nut industry, became affiliated Nov. 1 with the bolt and nut department of the Bethlehem Steel Co., Bethlehem, Pa. Practically his entire career was with Scranton Bolt & Nut Co., Scranton, Pa., the closing ten years as vice president. When Scranton Bolt & Nut Co. was merged into Wrought Iron Co. of Amer., Mr. Brodhead was appointed New York and New England manager, with office in New York.

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J. F. Bennett, Reynolds Wire Co., Dixon, Ill., was a member of the committee on arrangements the recent annual meeting and dinner Illinois Mfrs.' Assn., Chicago. Other wire industry men on this included D. P. Sommer, Keystone Steel & Wire Co., Peoria; H. C. McNeil, Ill. Iron & Bolt Co., Carpentersville; F. O. Hale, Ill. Bell Telephone Co., J. M. Gilchrist, Federal Elec. Co., and C. S. Dallas, Brass & Copper Co., all of Chicago.

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W. C. Buchanan, who joined the Keystone Steel & Wire Co., as assistant to the president, has been made vice-president and general manager. He was formerly identified with the Trumbull Steel Co., Warren, O., and had been prominent in the Empire Steel, Mid-States Steel & Wire, and others while engaged in financial and investment fields.

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Louis E. Creighton, identified with Union Drawn Steel Co., Beaver Falls, Pa., for the past 20 years, as vice president in charge of operations since 1927, has been appointed vice president and general manager of the Union Drawn Steel Co., subsidiary of Republic Steel Corp., Youngstown, O.

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John H. Ray, general solicitor, Amer. Tel. & Tel. Co., has been elected to succeed G. C. Pratt, mentioned elsewhere, as director and vice president, Western Elec. Co., a director of Elec. Research Prods. Inc., and has been appointed general counsel for E. R. P. I. and Western Elec.

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Robert S. Archer, since 1920 metallurgist in the research department of the Aluminum Co., of Amer., Cleveland, has resigned to become head of the metallurgical reasearch staff, A. O. Smith Corp., Milwaukee, effective Dec. 1.

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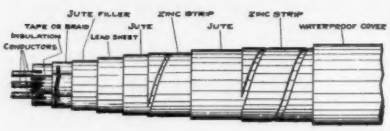
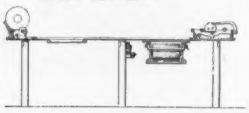
George C. Pratt has been elected vice president in charge of the Western Division, Elec. Research Prods., Inc., with headquarters in Los Angeles.

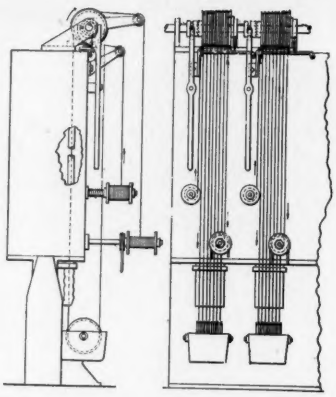
A Review of Recent Patents



Beers 1,779,872

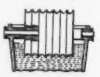


Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 551 Fifth Avenue, New York.



Hoeftman reissue 17,850

Oxer 1,780,533



Jessup 1,782,425

Hoeftman's Armored Cable Construction (extreme ltfe). Beers' Wire Cloth Measuring and Delivery Table (left above). Oxer's Electrical Conductor Design (right). Jessup's Apparatus for Coating Strands (extreme right). —:—

No. 1,777,900, METHOD OF AND APPARATUS FOR MAKING COILS. Patented Oct. 7, 1930, by Reginald F. Sedgley, Philadelphia. The method comprises passing wire continuously between rolls thereby flattening the wire, feeding the flattened wire continuously between feed rolls whereby the flattened wire is maintained under tension, and causing the tensioned flattened wire, while maintained under tension and moving continuously, to pass over a curling edge thereby imparting to it an inherent tendency to curl.

No. 1,778,559, WIRE BENDING MECHANISM, Patented Oct. 14, 1930, by Daniel Kondakjian, Newark, N. J. Particularly, this invention has reference to a machine for making anchor hooks for filament wires of incandescent electric lamps, radio tubes and the like, and is described as an improvement upon the patentee's application for patent, Serial Number 382,525, filed July 31, 1929. Especially does the present invention provide for the production of bottom or anchor hooks for lamp and tube filaments.

Reissue No. 17,850, ARMORED CABLE, Patented Oct. 28, 1930, by Alexander O. Hoeftman, Worcester, Mass., assignor to Amer. Steel & Wire Co., New Jersey, a Corporation of N. J. The wire conductor of this cable is surrounded with layers of sheet metal armor, separated from each other by a cushion or lower of jute or the like to relieve a blow or compression of the inner armor. The sheet metal armor s of non magnetic material.

No. 1,779,471, WIRE ROPE AND CABLE, Patented Oct. 28, 1930, by James Forrest Howe, Worcester, Mass., assignor to The Amer. Steel & Wire Co. of New Jersey, a Corporation of N. J. The present invention has for its object the provision of a non-spinning rope structure in which the six inner strands will offset substantially all the rotating tendency of twelve outer strands. The construction embodies a series of inner strands laid up in one direction, and an outer series of strands laid up around the inner strands as a core in the opposite direction and composed of at least twice as many strands as the inner series, the strands being composed of the same number of wires, the wires of the inner strands being of greater cross-section and composed of material having greater hardness and resiliency than the wires of the outer strands.

No. 1,779,610, FIRE DETECTING CABLE, Patented Oct. 28, 1930, by Edward Lyndon, New York, N. Y. In the operation of this device, an alloy of low fusibility, rendered plastic by the action of heat, is discharged under pressure through a duct into contact with one of the leads or wire conductors, thereby closing a circuit.

No. 1,779,872, WIRE CLOTH MEASURING AND DELIVERY TABLE. Patented Oct. 28, 1930, by Louis G. Beers, Trenton, N. J., assignor to The New Jersey Wire Cloth Co., Trenton, N. J., a Corporation of N. J. The table includes an unrolling support, a measuring device and a rolling support, in combination with other features.

No. 1,780,374, WIREWORKING MACHINE, Patented Nov. 4, 1930, by William M. Birch, Crawfordsville, Ind., assignor to Mid-States Steel & Wire Co., Crawfordsville, Ind., a Corporation of Ind. The principal object of the invention is to produce an automatic machine for the manufacture of wire splices which, when used, will permit the reuse of wire-bound boxes or other receptacles reinforced or bound with the wire, such splices being used with the free ends of the wires of such a box to rebind and to secure the box or receptacle. Such a splicing wire, to be manufactured by this wire-working machine, forms the subject matter of Letters Patent to A. L. Roebuck, No. 1,650,741, dated November 29, 1927.

No. 1,780,523, ELECTRICAL CONDUCTOR, Pat. Nov. 4, 1930, by George C. Oxer, New York, N. Y., assignor to American Brass Co., a Corporation of Conn. This conductor is adapted for the transmission of high-voltage energy. The construction includes multiple concentric hollow pathways of annular cross-section made of metal of high conductivity and supported from within by a metallic reinforcement extending throughout the length of the conductor, this reinforcement consisting of a spiralled metallic member of structural shape cross section.

No. 1,781,894, MACHINE FOR MAKING WIRE STRANDS, ROPES AND CABLES, Patented Nov. 18, 1930, by Edward A. Conner, Stratford, Conn., assignor to American Cable Co., Inc., a Corporation of Del. One of the objects of the invention is to provide a new process of imparting to the strand components a helical conformation preparatory to laying them to constitute the complete strand, etc., by subjecting the components to the action of dies or preforming devices which are given a rotary movement for the purpose of forming the components helically.

No. 1,782,425, APPARATUS FOR COATING STRANDS, Patented Nov. 25, 1930, by Richard Dale Jessup, La Grange, Ill., assignor to Western Electric Co., Inc., New York, N. Y., a Corporation of N. Y. In accordance with one embodiment of the invention, the wire to be coated is drawn from a supply spool directly to a capstan. It is then successively passed around individual idler pulleys mounted in a receptacle containing enameling material, through an oven ,around the same cap-

(Please turn to page 36)

Domestic Exports and Imports of Wire and Wire Products

Exports of iron and steel wire products in September and October, 1930
(In gross tons)

Items	October 1930	September 1930	October 1929	Year through October 1930	Year through October 1929
Wire rods	1,288	1,637	2,578	34,221	36,677
Hoops, bands and strips	2,609	1,916	4,026	35,366	61,023
Plain Wire	1,473	2,227	3,471	22,806	39,516
Barbed wire and woven wire fencing	3,566	2,901	5,673	34,778	56,605
Woven wire screen cloth	122	73	115	1,435	1,446
Wire rope	453	266	597	4,039	6,267
Insulated wire and cable	28	36	50	434	854
Other wire and manufactures	445	669	620	6,601	9,235
Wire nails	870	733	721	7,079	10,901
Nails other than wire	377	415	525	4,767	7,768
Tacks	27	35	52	379	1,577
Bolts, nuts, rivets, except track.	659	645	1,267	8,908	13,698
Totals, these 12 classifications	11,917	11,553	19,695	160,813	245,067

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Wire rods	400	496	642	7,395	13,250
Concrete reinforcement and other bars	6,295	2,393	3,017	35,100	31,970
Barbed wire	263	428	450	3,885	4,936
Round iron and steel wire	225	158	400	3,797	5,029
Steel telegraph & telephone wire	6	11	5	60	19
Flat wire and strip steel	100	47	187	999	1,850
Wire rope and strand	122	196	281	2,086	2,060
Hoops and bands	51	32	3	323	405
Other wire	2,916	2,444	3,732	18,787	38,069
Nails, tacks and staples	418	578	609	4,560	8,003
Bolts, nuts, rivets and washers	33	13	34	302	308
Totals, these 11 classifications	10,829	6,796	9,360	77,294	105,899

EXPORTS in October registered a gain of 639 gross tons over September, consequently the changes in individual products of interest to the wire industry were small. Plain wire showed a big increase, but this was offset by an equally big decrease in barbed and woven wire fencing. Screen cloth, and wire rope decreased, insulated wire and cable, and miscellaneous wire increased.

Imports decreased again, the the total being 2000 tons less than in September. Barbed wire, telephone wire, wire rope and nails increased. These increases were more than offset by the decrease in steel wire, flat wire and strip, miscellaneous wire, hoops and bands.

In the electrical field October showed a very considerable decrease over last year as did the 10 months ended October 31. The biggest decrease was in bare copper wire.

Receipts of card clothing totaled 12,802 square feet and were valued at $18,781—11,477 square feet ($16,006) coming from the United Kingdom and 1,325 square feet ($2,775) from Germany. Imports of wire cloth and screening dropped to 31,413 square feet—17,209 square feet coming from Germany, 9,502 square feet from Canada, 2,500 square feet from Belgium, and 2,202 square feet from France. Receipts of Fourdinier and other paper-making wires rose slightly to 34,471 square feet. Of this quantity, 11,010 square feet came from Germany, 10,250 square feet from Belgium, 7,791 square feet from Sweden, and 5,420 square feet from France. Imports of wire fencing and netting rose to the high figure of 3,160,850 square feet, of which quantity 1,589,625 square feet came from the Netherlands, 1,414,325 square feet from Germany, and 156,900 square feet from Belgium.

Wire heddle imports totaled only 1,275,000 pieces, with 1,167,000 pieces coming from France, 58,000 pieces from Germany, and 50,000 pieces from the Netherlands. Wood screw receipts again fell sharply, bringing the October total down to only 93 gross at a stated value of $484.

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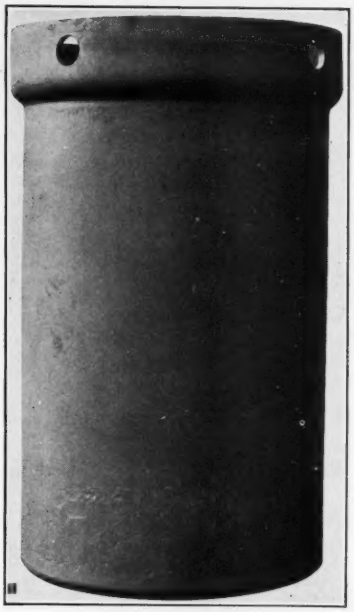
STANDARD FORGE FIRE-HAMMER WELDED

ANNEALING POTS

FOR ALL REQUIREMENTS



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can be furnished any practical size or shape. With either single or double bell offset at top and with or without lifting holes as shown.

The grade of steel entering into the construction of these pots is the result of more than thirty-five years experience.

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Lead Melting Pots
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Annealing Pans
Galvanizing Pots and Kettles

Columbiana Boiler Company
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IN NICKEL STEEL SETTINGS

Manufacturers for Over 35 Years
[Originators of the Steel Setting]
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$2.00 and up for one for a Room with Bath

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An Up-To-Date Coffee Shoppe
At Popular Prices

One Block from Columbus Circle and Central Park.

HOTEL ST. PAUL
60TH ST. WEST OF B'WAY, N.Y.

The Waterbury Wire Die Co.

Diamond, Composition and CHILLED IRON DIES
Waterbury, Conn.

Wire Questions and Answers

(*Continued from page 17*)

in the Memorandum. Please return this form to the writer as promptly as possible. Where action taken by the meeting is disapproved, please indicate the reason for such disapproval.

Attention is particularly called to the posting of the next meeting of the Sectional Committee in New York next May. Please indicate the date and place of any important convention or other occasion at that time with which conflict should be avoided.

H. W. Bearce, U. S. Bureau of Standards, Washington D. C.; Robt. H. Dibble, American Sheet & Tin Plate Co., Pittsburgh, Pa.; A. J. Hanlon, International Nickel Co., New York City; F. W. Holland, Postal Telegraph Co., New York City; W. H. Hutchins, Chr. pro tem, North East Electric Co., Rochester, N. Y.; A. P. Hickox, Scoville Mfg. Co., Waterbury, Conn.; F. H. Nullmeyer, Youngstown Sheet & Tube Co., Youngstown, O.; E. E. Rose, Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.; E. H. Lewis, Rep. C. E. Wilson, General Electric Co., Bridgeport, Conn., (For Mr. R. C. Moeller, N. E. M. A.); John Gaillard, American Standards Assn., New York, N. Y.; C. B. LePage, American Society of Mechanical Engrs., New York, N. Y.; R. S. Burnett, Mgr. Stds. Dept., S. A. E., New York, N. Y.

The meeting was convened at 10:30 a. m. by Mr. Burnett who presided temporarily. He explained briefly that the Committee had been authorized by the American Engineering Standards Committee for the purpose of bringing together on a national basis, the industrial interests that would be directly affected by the standardization of the methods of gaging sheet metals, wires, tubing, etc. Inasmuch as those present had read the explanation of the organization and functions of the Sectional Committee, its officers and the scope of the project as well as the connection and responsibility of the sponsors with it, that was appended to the Agenda, further introductory remarks were made only in answer to a few questions. The meeting proceeded in accordance with the Agenda that had been sent to the Committee members with the letter of Nov. 1, giving notice of the meeting.

Mr. Gaillard, who represented the American Standards Association (formerly the American Engineering Standards Committee) explained briefly that the A. E. S. C. was organized several years ago to correlate engineering standardization on a national basis and to act as a channel for communication with countries abroad in the development of international standards. He then described the provisions for organizing Sectional Committees under sponsors, and as of more recent date, autonomous Sectional Committees without a sponsor. Mr. Gaillard then distributed copies of the minutes of the conference on Wire and Sheet Metal Gages and of the Special Committee on Sponsorship and Scope that were held in New York on Mar. 18, 1926, and referred especially to the recommendations of the conference that the Sectional Committee be organized to formulate a standard for gaging systems for wire and sheet metal and further, that such systems be based on the decimal system rather than a gage name or number system.

Inasmuch as the attendance at the meeting was so small, it was agreed that only a temporary Chairman and temporary Secretary be selected at this time, rather than permanent officers. Messrs. Hutchins and Rose were nominated, seconded and duly elected to serve as temporary Chairmen. It was agreed that Mr. Burnett would serve as temporary Secretary until the next meeting.

The present scope of the project as defined at the general conference of Mar. 18, 1926 was read as follows:

> The standardization of a method of designating the diameter of metal and metal alloy wire, the thickness of metals and metal alloys in sheet, plate* and strip form and wall thickness of tubing, piping and casings made of these materials; and the establishment of a standard series, or standard series, of nominal sizes and of tolerances for wires, sheets, plates and strips.

In discussing the scope, it was questioned whether the recommendations to be formulated should be based on the customary American units of measurement only; whether to include metric equivalents of dimensions ant their tolerances; or whether to base the recommendations on the metric system. It was suggested that the recommendations be given only in the terms of customary American units of measure for the sake of simplification and to facilitate the work of the Sectional Committees but it was explained that the reports would be much more valuable if they included the metric equivalents because of their use in export trade. It was also pointed out that many tables give the converted dimensions for sheet thicknesses, wire diameters, etc., to an unnecessary number of decimal places and that by including the metric equivalents in the reports, all conversions could be definitely limited to a reasonable number of significant decimal places. It was also questioned whether the scope of the Sectional Committee's project should include metallic products coated with non-metallic materials. The discussion indicated that this class of product should not be included in the scope. It was also stated that "plates" are always given in fractional inch sizes and therefore need not be included in the scope of the project.

On motion duly seconded, it was voted that all reports of the Sectional Committee be given in the customary American units of measure, but including the metric equivalents carried to only the desired number of significant decimal places.

It was also voted to retain the present scope of the project with reference to "plates" omitted, with the understanding that it does not include metallic products coated with non-metallic materials, and further, with the understanding that the Technical Committees may recommend revision or modifi-

*The item "plates" to be omitted from the project.

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PRACTICALLY INDESTRUCTIBLE
STANDARD TYPES 2½ IN. TO 8 FT.
SPECIAL TYPES MADE TO ORDER
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THE AMERICAN PULLEY CO.
PRESSED STEEL
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cation of the scope as may be desirable after further progress is made in the work.

Mr. Burnett explained that the Technical (or Sub-) Committees, as given in enclosure B with the Agenda for the meeting, were suggested in order to facilitate the preparation of reports on the basis of logical classification of the products under consideration. Discussion indicated approval of having a Technical Committee on Flat Stocks, including both ferrous and non-ferrous metals and a Technical Committee on Wires and Rods, including both ferrous and non-ferrous metals. It was felt, however, that tubing, pipes, conduits and casings, for which two Technical Committees were suggested, were so closely related that they should all be classified under one Technical Committee with the provision that this Technical Committee should be empowered to subdivide its work as it deemed desirable.

On motion duly seconded, it was voted that the following three Technical Committees be organized, the Chairman and nucleus membership of each to be designated by the temporary Chairman of the Sectional Committee, and to authorize the Chairman of each Technical Committee to expand the personnel of his Technical Committee as he and the members thereof deem necessary. It was further voted that each Technical Committee Chairman could designate members on his Committee from the Sectional Committee or select qualified representatives from any outside source. It was further voted that each Technical Committee Chairman should organize his Committee, arrange with its members for holding of meetings, gathering of data, drafting of reports and to function independently of the Sectional Committee so far as its own assignment is concerned.

The following were appointed by temporary Chairman Hutchins.

Technical Committee No. 2 on wires and rods (Including ferrous and non-ferrous metals)

E. E. Rose, Chr. (A. S. M. E.) Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa. (U); F. W. Holland (Member at Large) Postal Telegraph Co., New York City (U); A. P. Hickox (N. A. P. A.), Scovill Mfg. Co., Waterbury, Conn. (P); W. M. Gladding (A. S. M. E.) Morse Twist Drill Co., New Bedford, Mass. (P); H. W. Bearce, Division of Weights & Measures, Department of Commerce, Washington, D. C. (G); F. H. Nullmeyer (Assoc. Amer. Steel Mfrs.) Youngstown Sheet & Tube Co., Youngstown, Ohio (P); Representative General Cople Corp. (P).

Technical Committee No. 3 on tubing, piping, conduit and casing (Includes all rolled, drawn, or extruded hollow stocks)

F. H. Nullmeyer, Chr. Youngstown Sheet & Tube Co., Youngstown, Ohio (P); W. A. Rose (Amer. Coc. Heat. and Vent. Engrs.) American Blower Co., Detroit, Mich. (U); K. D. Williams (Amer. Soc. Naval Engrs.) Bureau of Engrg., Navy Dept., Washington, D. C. (U); Representative, American Petroleum Institute (U); Representative, Chase Metals Works (P); Representative, Aluminum Co. of America (P).

The following phases of each Technical Committee's project were suggested

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Koebel-Wagner diamond dies are selected from finest quality large diamonds to provide extra heavy walls.

All Koebel-Wagner diamond dies are designed with shapes to give the least resistance and maximum production on all kinds of wire.

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Cut Welding And Production Costs With

MICROMETER PRECISION — MICRO-WELD — TRADE MARK

Two models of MICRO-WELD with capacities from No. 20 wire to 5/8-inch rods will take care of your butt-welding work BETTER—FASTER—AND AT LESS COST!

Greater efficiency—new design—new ideas in construction—more capacity for work—much lower price—these are the reasons why you should hurry to learn all about MICRO-WELD.

MODEL E (SHOWN HERE) SELLS FOR $175.00.

(2½ kw. capacity — welds wires from No. 20 to No. 4 — perfectly.)

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Slightly lower size limits on copper and aluminum.

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as a guide in the study of their project and in formulating their reports.

(a) Define scope of each Technical Committee project.
(b) Clarify terms used by establishing nomenclature.
(c) Classify products into logical groups.
(d) Determine methods of designating or expressing sizes.
(e) Determine tolerances or range of tolerances on dimensions.
(f) Include metric equivalents to desired number of significant decimal places.

Mr. Burnett explained that in drafting the organization of the Sectional Committee, the sponsors had endeavored to confine the membership so far as possible to national industrial groups, Association or Societies rather than to select the members from individual companies and that it was realized that the Sectional Committee might be strengthened by representation of Associations, etc., not now included. He referred to the list of those invited to designate representatives who had either declined or had not been heard from, as given at the end of Enclosure C with the Agenda. The members present indicated that the American Sheet Steel Mfrs'. Committee is non-existent. Mr. Dibble also stated that the National Association of Flat Rolled Steel Mfrs. has recently included the tin plate manufacturers and should be represented on the Sectional Committee. The members present gave no suggestions as to a national Association or group of the copper or brass interests other than the Copper and Brass Research Association, which has declined invitation to appoint a representative. The appointment of a Federal Specifications Board representative on the Committee was also discussed.

The members present felt that the approximate time and place for the next meeting of the Sectional Committee as a whole should be decided upon and it was voted that the next meeting should be held in New York during the latter part of May, 1929. The definite time of the meeting was left for the temporary Chairman and Secretary of the Committee to determine. It was the sense of the meeting that each Technical Committee should proceed at once with its project in order to have its report ready for discussion at the next general meeting of the Sectional Committee in May, 1929.

C. B. LePage, Standards Secretary of the A. S. M. E., laid before the meeting a tabulation of the gage numbers and corresponding decimal dimensions of 30 gaging systems used in America that had been prepared by Col. E. C. Peck, of the National Screw Thread Commission. Mr. Gaillard, of the A. S. A., dis-

tributed copies of the table of preferred numbers that have been informally approved by the A. E. S. C. and recommended to industry for trial in practice. Mr. Burnett distributed additional information that had been compiled by Col. Peck together with data from the Webb Iron Works and a suggestion from the General Electric Co. relative to gaging systems. The members discussed the desirability of reproducing the tables of various gaging systems for distribution among the Committee members. In this connection, Mr. Bearce agreed to furnish the members of the Committee with the Bureau of Standards Letter Circular No. 24 which he stated would probably give all the information that will be needed on present gaging systems. It was understood that copies of this letter circular would be forwarded to the members of the Committee with the Unconfirmed Minutes of this meeting.

From R. S. Burnett, Manager
Standards Department,
Society of Automotive Engineers, Inc.,
29 West 39th Street,
New York, N. Y.

The Wire Association:

The work of this Sectional Committee seems to progress very slowly indeed, even under pressure by the sponsors to go ahead with it. I do not know whether this is because standardization in this field is at best very difficult and there is a natural tendency to avoid opening a question that is more or less of a serious one with many commercial interests.

I expect to have an opportunity to go over the whole program with the officers of the present Committee within the next two or three weeks in a further attempt to make definite progress.

Speaking for the Society of Automotive Engineers as one sponsor we will be very glad indeed to have the Wire Association represented on the Committee and I feel sure that the A. S. M. E. as our cosponsor, will feel likewise. I will write you further about this later on.

I would suggest that if you are immediately interested in the work of this Sectional Committee, you inquire directly of Mr. R. R. Rose Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., as to what progress has been made. He is the key man in the situation at present, being a sort of joint Chairman of the three Technical Committees on Wire, Tubing and Sheet, with the understanding that he would outline a definite plan of procedure for the whole project.

From John Mordica,
Bethlehem Steel Company
Maryland Plant,
Sparrows Point, Md.

The Wire Association:

The chart of Mr. E. H. Webb is very interesting, at least to me, and while at this writing I do not thoroughly understand it in its entirety, I feel that Mr. Webb has done a nice job toward getting out material for a new gage.

I am of the opinion however, that to adopt or standardize a gage of this kind is as remote as adopting the metric system, as you know that there are at present six or seven different gages in use, such as Brown & Sharpe, Imperial,

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Our sixty years experience,
The quality of our stones,
Our special steel setting,
The output of our French Plants,
The large stock we are carrying,
Enable us to take care of the most particular requirements.

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Fine Wire Manufacturers

OSSINING Established 1902 NEW YORK

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Copper Wire Specially Processed for Enameling Purposes

Copper	Lead
High Brass	Zinc
Low Brass	Commercial Bronze
Pure Tin	Phosphor Bronze
Cadmium	Silver Plated Copper
Bronze, Various Grades	False Gold

10%, 18%, 30% Nickel Silver

LAHN

False Gold Copper Silver Plated Copper

BRUSH WIRES CRIMP and STRAIGHT

Brass	Copper
Steel	Nickel Silver
	Phosphor Bronze

Metallic Fibre for packing purposes

Birmingham or Stubbs, Washburn-Moen, English Legal Standard and several others that I cannot recall at this time. What I had in mind was to standardize on one of the gages now in use.

From E. H. Webb

The Wire Association:

The first vertical column on my chart with the caption "Diam." represents the diameter of the wire in inches, the horizontal column represents the breaking strength in pounds of the wire and the 45 diagonal lines represent the breaking strength in pounds per square inch. For example, if a wire .142 in. in dia. has an actual breaking strength of 1,496 lbs. (horizontal column top or bottom) the breaking strength per square inch is 94,406 lbs. (diagonal line). We use the chart to determine whether the wire is properly annealed for that stage of its processing.

Again the same size may be patented and in order to obtain the proper strength at the finished size we may need a patented strength of 177,800 lbs. per square inch (diagonal line). By using the chart we learn that we need at .142 in. diam. a breaking strength of 2,818 lbs. (vertical line extending to horizontal column top or bottom). Intersection of .142 horizontal line, 2,818 vertical line, 177,827 diagonal line.

In certain work we know that 90% total reduction in area gives us the qualities that we desire in the finished wire, so for any finished size we can quickly determine the size to start with. For example, for finishing .040 wire use .1226 wire and for finishing .010 use .0318 wire, etc. Again we may want a total reduction in area of 75% in four equal drafts. We find that this reduction in area corresponds to six sizes so we draft 1½ size per draft or 29.2%. For example, processing .0318 (No. 20) use .0634 (No. 20-6=14) draft .0534, .0449, .0378, .0318. We know that in certain of our work we need a reduction of area at fracture in the wire of at least 60%, which corresponds to a reduction of four sizes. We can, therefore, determine very quickly from the chart the diameter desired at fracture for any size that we may be testing.

The Webb wire gage is almost like the B&S gage but more evenly divided, for example:—

B&S		
Size	Diam.	Area
7	.14428	.016349
17	.045257	.0016086
27	.014195	.00015826
37	.004453	.000015567
Webb Wire		
Size	Diam.	Area
7	.1420	.015848
17	.0449	.0015848
27	.0142	.00015848
37	.00449	.000015848

It certainly is easier to remember that No. 7 equals .142 in. dia. and No. 27 equals .0142 in. dia. and that their properties vary as 100 than it is to remember that No. 7 equals .11428 and No. .014195 in. and that there is no simple relation between their properties. Using the Webb wire gage one knows that there are ten times as many feet per pound in a wire ten numbers smaller than the original wire and 100 times as many feet per pound in a wire twenty numbers smaller than the original

wire (1/10th the diameter of the original wire).

No. 7 .142 in. dia. 18.5 ft. per pound
No. 17 .0449 in. dia. 185. ft. per pound
No. 27 .0142 in. dia. 1850. ft. per pound

Moreover as the chart has the column of areas it can be used with any shape whose area is known.

In short, the Webb wire gage offers a simplified gage universal in application. A chart based on this gage affords a quick means of determining in small compass the tensile strengths of wires and of all sections whose areas are known; the per cent reduction of area at fracture; the number of feet per pound of the material and a quick means of laying out drafting.

Wire in the New Tariff

(*Continued from page 15*)

not thicker than one-quarter of one inch and not exceeding sixteen inches in width, whether in long or short lengths, in coils or otherwise, and whether rolled or drawn through dies or rolls, or otherwise produced, 25 per centum ad valorem: Provided, That all wire of iron, steel, or other metal coated by dipping, galvanizing, sherardizing, electrolytic, or any other process with zinc, tin, or other metal, shall be subject to a duty of two-tenths of 1 cent per pound in addition to the rate imposed on the wire of which it is made; telegraph, telephone, and other wires and cables composed or iron, steel, or other metal (except gold, silver, platinum, tungsten, or molybdenum), covered with or composed in part of cotton, jute, silk, enamel, lacquer, rubber, paper, compound, or other material, with or without metal covering, 35 per centum ad valorem; wire rope, 35 per centum ad valorem; wire strand, 35 per centum ad valorem; spinning and twisting ring travelers, 35 per centum ad valorem; wire heddles and healds, 25 cents per thousand and 30 per centum ad valorem.

(b) Ingots, shot, bars, sheets, wire, or other forms, not specially provided for, or scrap, containing more than 50 per centum of tungsten, tungsten carbide, molybdenum, or molybdenum carbide, or combinations thereof: Ingots, shot, bars, or scrap, 50 per centum ad valorem; sheets, wire, or other forms, 60 per centum ad valorem.

Par. 317. All galvanized wire not specially provided for, not larger than twenty one-hundred-

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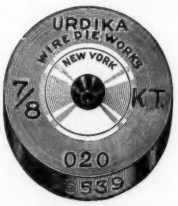

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ths and not smaller than eight one-hundredths of one inch in diameter, of the kind commonly used for fencing purposes, galvanized wire fencing composed of wires not larger than twenty one-hundredths and not smaller than eight one-hundredths of one inch in diameter; and all wire commonly used for baling hay or other commodities, one-half of 1 cent per pound.

Par. 318. Woven-wire cloth: Gauze, fabric, or screen, made of wire composed of steel, brass, copper, bronze, or any other metal or alloy, not specially provided for, with meshes not finer than thirty wires to the lineal inch in warp or filling, 25 per centum ad valorem; with meshes finer than thirty and not finer than ninety wires to the lineal inch in warp or filling, 40 per centum ad valorem; with meshes finer than ninety wires to the lineal inch in warp or filling, 50 per centum ad valorem. Fourdrinier wires and cylinder wires, suitable for use in paper-making machines (whether or not parts of or fitted or attached to such machines), and woven-wire cloth suitable for use in the manufacture of Fourdrinier wires or cylinder wires, 50 per centum ad valorem.

Par. 319. (a) Iron or steel anchors and parts thereof; forgings of iron or steel, or of combined iron and steel, not machined, tooled or otherwise advanced in condition by any process or operation subsequent to the forging process, not specially provided for, 25 per centum ad valorem.

(b) Autoclaves, catalyst chambers or tubes, converters, reaction chambers, scrubbers, separators, shells, stills, ovens, soakers, penstock pipes, cylinders, containers, drums, and vessels, any of the foregoing composed wholly or in chief value of iron or steel, by whatever process made (except by casting), wholly or partly manufactured, if over 20 inches at the largest inside diameter (exclusive of non-metallic lining) and having metal walls one and one-fourth inches or more in thickness, and parts for any of the foregoing, 35 per centum ad valorem.

Par. 321. Antifriction balls and rollers, metal balls and rollers commonly used in ball or roller bearings, metal ball or roller bearings, and parts thereof, whether finished or unfinished, for whatever use intended, 10 cents per pounds and 45 per centum ad valorem.

It is estimated that the average duties applied under this new tariff would be about 16.0 per cent as compared with an average of 13.8 per cent collected under the 1922 law. This compares with the average level of the tariff under:

The McKinley law of 23.0 per cent.

The Wilson law of 20.9 per cent.

The Dingley law of 25.88 per cent.

The Payne-Aldrich law of 19.3 per cent.

The Fordney-McCumber law of 13.83 per cent.

Under the Underwood law of 1913 the amounts were disturbed by war conditions varying 6 per cent to 14.8 per cent.

The proportion of imports which will be free of duty under the new law is estimated at from 61 to 63 per cent. This compares with averages under

The McKinley law of 52.4 per cent.

The Wilson law of 49.4 per cent.

The Dingley law of 45.2 per cent.

The Payne-Aldrich law of 52.5 per cent.

The Fordney-McCumber law of 63.8 per cent.

Under the Underwod law of 1913 distturbed conditions varied the free list from 60 per cent to 73 per cent, averaging 66.3 per cent.

Canadian Tariffs

WIRE manufacturers are interested in the new Canadian tariffs especially in the arrangement of duties, which give British preference also an intermediate tariff which applies to certain foreign nations with which Canada has made treaties. In the following reference to these duty rates B. P. means "British preferencial tariff"; I. T. means "Intermediate tariff"; G. T. means "General tar-

iff"; n. o. p. means "Not otherwise provided.

Crude Iron and Steel

Scrap, free from all countries.

Pig iron, n.o.p., rates unchanged, $1.50 B.P., $2.50 I.T. and G.T.

Ferro-alloys, free under the B. P., G. T. rate varying between 5% and 10% on ferro-silicon and ferro-phosphorous.

Ingots and Billets

Ingots, cogged ingots, blooms slabs, billets, etc., valued at over 3 cents a lb. free B.P., 5% G.T., when imported by makers of special steels.

Ingots, etc., n.o.p. of a class or kind not made in Canada, free B.P., $2.25 I.T., $2.50 G.T.

Bars and Rods

Bars, rods and billets, weighing less than 60 lbs. per yard, not further processed than hammered or pressed, 15% B.P., 25% LT., 30% GT. Cold-rolled, cold drawn, reeled, turned or ground, n.o.p., 15% B.P., 25% I.T., 30% G.T. Hot-rolled, 5% B.P., 12½% I.T., 15% G.T.

Bars or rods of iron or steel, including billets, weighing less than 60 lbs. per yard, hot-rolled, including rods in coil imported by chain manufacturers, free B.P., $3.50 per ton I.T., $3.50 G.T., and including bars when imported by makers of shovels, free B.P., $2.25 I.T., $3 G.T.

Wire

Wire rope, 15% B.P., 22½% I.T., 25% G. T.

Drawn flat or cold-rolled, flat wire, coated or not, not more than 0.25 in. in width and less than 0.1875 in.in thickness, 7½% B. P., 15% I.T., 20% G. T.

Iron or steel wire, coated with zinc or spelter, n.o.p., 10% B.P., 17½% I.T., 20% G.T.

Iron or steel wire, single or plied, covered with any material, including cable so covered, coated, n.o.p., 15% B.P., 25% I.T., 30% G.T.

Woven or welded wire fencing of iron or steel, coated or not made from wire not more than 0.144 in, and not less than 0.08 in. dia., with tolerance not to exceed 0.004 in.; wire fencing of iron or steel, coated or not, n.o.p., free B.P., 12½% I.T., 15% G.T.

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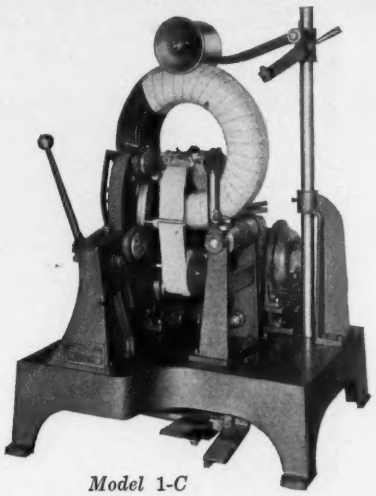

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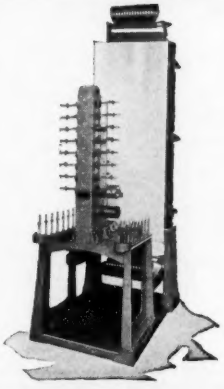

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Steel spring wire, not less than 0.4% by weight of carbon, of certain gauges, when imported by wire mattress makers, free B.P., 5% I.T., 7½% G.T.

Flat steel wire, of certain gauges in coils, when imported by manufacturers of corset wires and dress stays, free B.P., 5% I.T., 7½% G.T.

Wire of steel, valued at not less than 2¾ cents per lb., when imported by wire rope manufacturers, free B.P., 5% I.T., 7½% G.T.

Wire of steel, single, not covered, in coils, for fishing operations, free B.P., 7½% I.T., 10% G.T.

Springs of iron or steel, for the running and draft gear of railway vehicles, including locomotives and tenders, 20% B.P., 30% I.T., 35% G. T.

Development of Wire Rope

(*Continued from page 13*)

sway as a favorite rope for winding purposes in mine shafts, but now it is almost a thing of the past.

After this the next important invention was the flattened strand rope which was patented by Latch & Batchelor in 1888.

Triangular Strands Give Stability

UNDER this system the strands have either a triangular or elliptical shape. While this invention gave a more stable rope the negative stresses created in the twisting of strands, which are present to a considerable de-

Fig. 42

Fig. 43

gree in the round rope, are increased when the strand is twisted into a triangular or elliptical form.

In the year 1890, J. B. Stone

took out a patent for the filler construction, that is the filling up of the interstitial spaces with fine wires.

This, curiously enough, was practically repeated in a new pat-

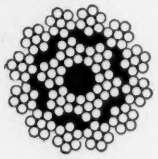


Fig. 44

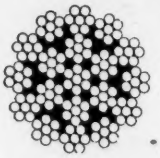


Fig. 45

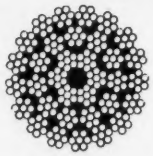


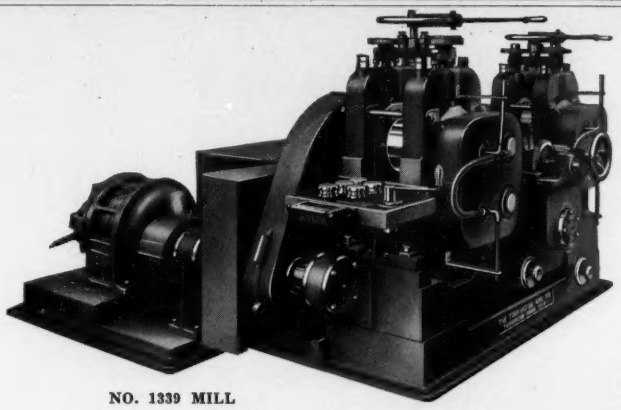
Fig. 46

ent taken out by Bruntons & King in 1905.

The above are forms of concentric ropes in which the outer layer of strands is twisted in one direction and the inner layers in the opposite direction. By this means the tendency to unwind created by one series of strands is neutralized by the tendency of the other series to unwind in the opposite direction. However, the application of this rope brought to light other difficulties. When the rope was subjected to torsion in the direction in which the outer strands were twisted that would of course create a certain amount of pressure inwards, whereas the interior strands would be slightly unwound and would have a tendency to force outwards. This causes dislocation of strands and rapid deterioration of the rope. Although this rope created quite a sensation when first put on the market, it is rarely met nowadays as a working rope.

Elliptical Stranded Non-Twisting Rope

AFTER this there came in the year 1909 the patents of Newall and Skelton of a non-twist rope made up of elliptical strands, and then Leschen in 1910 patented such a rope with elliptical and triangular strands intermixed. These, however, do not appear to represent special improvement.



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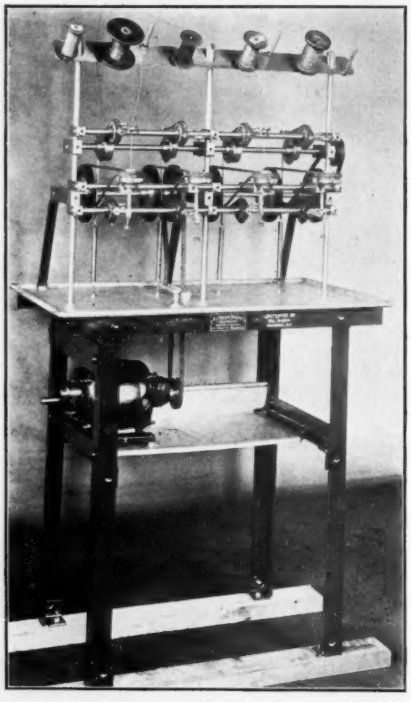

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In the year 1910 Craven & Speeding put on the market a rope invented by Mr. Westgarth.

Mr. Westgarth claimed for his invention that it would:

1. Prevent the indentation of nickling of the wires which is the invariable result of the strands crushing each other when under tension.
2. Prevent that internal corrosion of the wires which takes place even in a dry shaft when the hemp core decomposes and generates an acid.
3. Provide a core which would resist the pressure of the loaded strands more efficiently than a core composed entirely of hemp.

These claims have apparently not been wholly justified in practice.

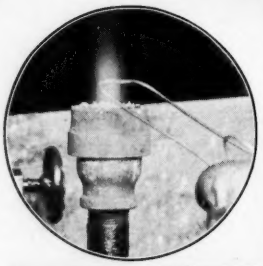
Point contact and its advantages or disadvantages compared with line contact will be considered in the February issue.

REVIEW OF RECENT PATENTS

(*Continued from page 24*)

stan, and so on until the wire has made a predetermined number of passes through the enameling receptacle and oven, and thence from the capstan to a take-up spool.

HANDY & HARMAN Silver Solders QUALITY SERVICE



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Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

BRAIDER CARRIERS
Mossberg Pressed Steel Co., Attleboro, Mass.

CASTINGS—Wire Mill
E. J. Scudder Foundry & Machine Co., Trenton, N. J.

CLEANING & PICKLING EQUIPMENT
Vaughn Machinery Co., Cuyahoga Falls, O.

CRANES—Wire Mill
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIES—Chilled Iron
Waterbury Wire Die Co., Waterbury, Ct.

DIES—Diamond
Addor Wire Die Works, N. Y.
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Bellet Diamond Die Works, N. Y.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
Globe Diamond Die Corp., New York.
Koebel Wagner Diamond Corp., New York, N. Y.
F. Krause & Co., Inc., Jersey City, N. J.
Master Wire Die Corp., New York, N. Y.
Union Wire Die Corp., New York, N. Y.
Urdika Wire Die Co., N. Y. C.
Vianney Wire Die Works, New York.
Waterbury Wire Die Co., Waterbury, Ct.

DIES—Composition
Addor Wire Die Works, N. Y.
Bellet Diamond Die Works, N. Y.
Urdika Wire Die Works, Inc., New York

DIES—Repairs & Re-Cutting
Addor Wire Die Works, N. Y.
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Bellet Diamond Die Works, N. Y.
Cochaud Wire Die Corp., New York.
F. Krause & Co., Inc., Jersey City, N. J.
Urdika Wire Die Co., N. Y. C.
Vianney Wire Die Wks., N. Y.

DIES—Recutting and Repolishing Machine
Wm. Haddow, Ossining, N. Y.

DIES—Rod and Tube Drawing
Carboloy Co., Inc., Detroit, Mich.
Master Wire Die Corp., N. Y.
Union Wire Die Corp., N. Y.

DIES—Tungsten Carbide
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GALVANIZING—Hot
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Columbiana Boiler Co., Columbiana, O.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

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American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt. Co., Providence, R. I.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
Haskell-Dawes Machine Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
New England Butt Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Company, Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
Haskell-Dawes Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Amer. Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Coiling
Broden Const. Co., Cleveland, O.
Haskell-Dawes Mach. Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrell Fdry & Machine Co., Waterbury, Conn.

MACHINERY—Cutting
American Insulating Mach'y Co., Phila., Pa.
Hallden Machine Co., Thomaston, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Extruding
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing Wire
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Measuring Wire
New England Butt. Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

MACHINERY—Nail
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

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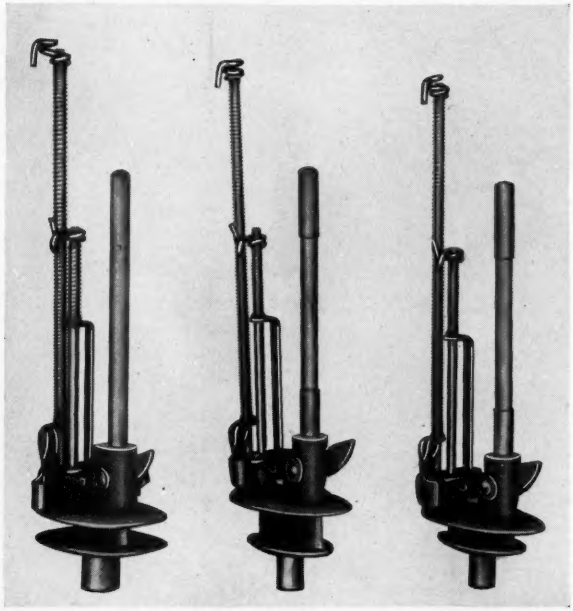

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MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Torrington Mfg. Co., Torrington, Conn.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Spring Making
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MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Hallden Machine Co., Thomaston, Conn.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
American Insulating Mach'y Co., Phila Pa.
Haskell-Dawes Machine Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Const. Co., Cleveland, O.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
Sleeper & Hartley, Worcester, Mass.
Waterbury-Farrell Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
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New England Butt Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Company, Paterson, N. J.

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Torrington Mfg. Co., Torrington, Conn.
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Torrington Mfg. Co., Torrington, Conn.
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Morgan Construction Co., Worcester, Mass.
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POTS
Columbiana Boiler Co., Columbiana, O.

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Watson Machine Co., Paterson, N. J.

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Vaughn Machinery Co., Cuyahoga Falls, O.

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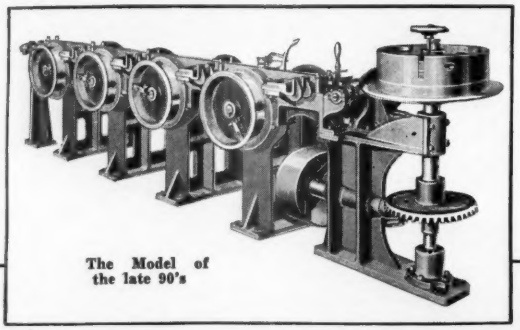

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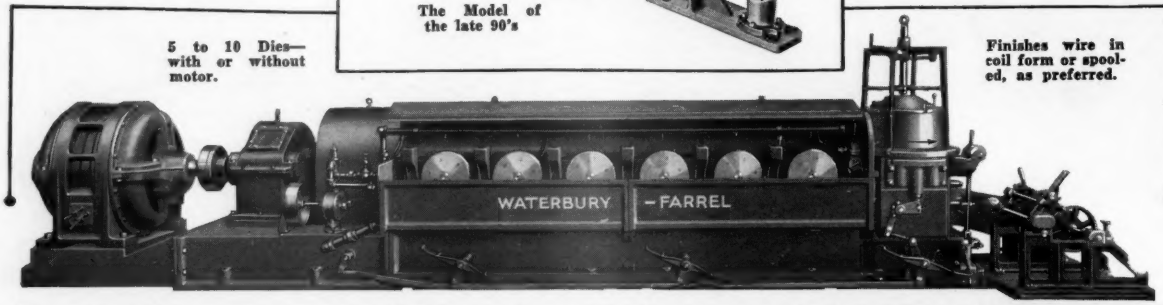

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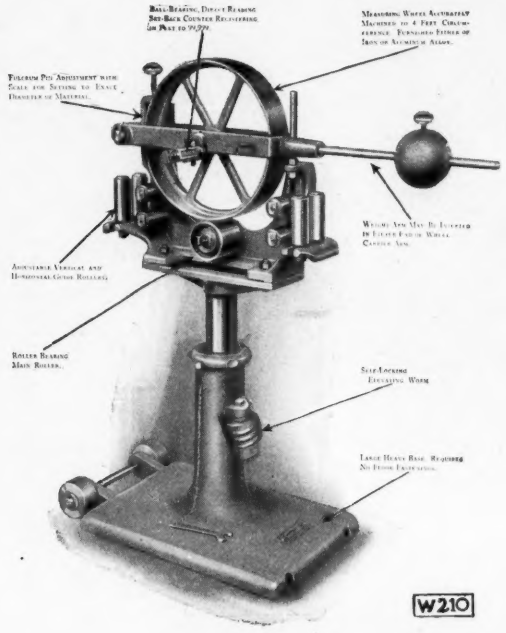

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